

Research concept – Zero point energy

The finite speed of propagation of the electric and the magnetic field

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Abstract:

The zero point energy of the electromagnetic waves in the quantum vacuum (ZPE) is an interesting source of energy, under investigation since many years. The author participated in this research since eleven years, verified the ZPE in the laboratory, and developed a fundamental theory of ZPE-conversion [Tur 12]. The research-activities are now suspended, but many people ask how to continue. Here is the answer, a concept free for revival by everybody.

The concept presents a collection of ideas how to resume ZPE research, defining many open tasks and questions. Of course not all aspects and details are visible yet, thus there is no concrete planning of financial- and working time- resources.

After explaining the theoretical fundament, the concept describes the research suggested for the construction and manufacturing of an „Electro-mechanical double-resonance converter“ (EMDR) as developed by the author, and furthermore the investigation of several other ZPE-converters referred in the literature.

By the way, it must be emphasized, that the operation of a ZPE-motor gains energy from the quantum-vacuum and thus it alters the curvature of the four-dimensional space-time of the universe.

Unique feature:

The scientific concept presented here, is worldwide unique, because it is the only ZPE-utilization concept, which is based on a fundamental theory completely well within the generally accepted rules of standard physics, so that it is completely included into our view of the world, as we know it up to now. The fundamental theory, developed by the author can be given the name of “Field’s propagation with finite speed”, which can be applied to all four fundamental interactions of nature. It has been presented in numerous publications (see below) [Tur 12].

Hints to the practical modus operandi:

For different applications have different requirements to their individual energy supply, several ZPE-systems have to be developed in order to fulfill the requirements of each application:

- Cars for instance can be driven quite well with magnetic motors (compare: electromobility), which have a rotating shaft producing mechanical power.
- Pocket calculators, laptops, mobile phones and watches need a ZPE power-supply which produces only electrical power (not mechanical), operating without producing noise or vibrations. Therefore the crystal cell is good candidate [Har 12], which can be handled rather similar like a normal accumulator, except for the difference that recharging is not necessary.
- Thermal heating in buildings can be supplied for instance by Brown’s Gas, being produced by pulsed hydrogen synthesis (in over-unity), having a rather high density of thermal power.
- Wherever we have electromotors (as for instance in drilling machines and mixers in the kitchen, ...), the author’s EMDR-converter is good power-supply [Tur 11].

Consequently it is sensible, to begin the development of several different ZPE-converter systems in parallel at the same time. For this reason the author suggests to include several such systems in the scientific planning and activities from now on.

1. General theoretical fundament

The possibility for the conversion and utilization of ZPE-energy goes back to the theory of the “Field’s propagation with finite speed”, which shall be briefly introduced now.

In the classical approximation of the interaction of two partners, we experience the forces of

gravitation (between two ponderable masses, following Newton)	$\vec{F}_G = C_G \cdot \frac{m_1 \cdot m_2}{ \vec{r} ^2} \cdot \vec{e}_r$ force of gravitations with a factor of proportionality $C_G = \gamma$ (constant of gravitation)	(1)
Coulomb-forces between two electrical charges [Jac 81]	$\vec{F}_C = C_C \cdot \frac{q_1 \cdot q_2}{ \vec{r} ^2} \cdot \vec{e}_r$ Coulomb-force with a factor of proportionality $C_C = \frac{1}{4\pi\epsilon_0}$	(2)
between two magnets (Coulomb’s law of magnetostatics, confirmed by Gauß [Ber 71])	$\vec{F}_M = C_M \cdot \frac{p_1 \cdot p_2}{ \vec{r} ^2} \cdot \vec{e}_r$ magnetic force (along the dipol’s axis of symmetry) with a factor of proportionality C_M in relation to the dipol strength p_i	(3)

The analogy of the three laws is obvious: It is a mathematical fraction with the numerator consisting of “m”, “q” or “p” which are the physical values, describing the partners of interaction, and the denominator containing the distance between the partners “r”. The fraction is multiplied with an individual factor of proportionality. The dependency from the distance is the same in all three cases. And it is important to emphasize, that all three of these laws, do not describe any dependency of time. This means that the interaction between the partners propagate instantaneously, without consuming any propagation time. Not taking any propagation time into account means the propagation (of the field’s of interaction) at the same moment across the whole universe. This is a fair approximation for many calculations within classical electrodynamics, but it is strictly against all intuition and it is in sharp contradiction with the Theory of Relativity, according to which every speed has an upper limit at the speed of light [Goe 96].

For philosophical reasons, it shall be mentioned that the theory of the “Field’s propagation with finite speed” does not need the quantitative value of the speed of light, but it only needs the assumption, that the propagation speed is not infinitely large. Our theory only requires the finite speed of propagation. In principle, this approach is not new, for it is already reported in literature by Liénard and Wiechert (see below).

If the **finite** propagation speed of the fields is taken into account, instead of the (inexact) classical approximation of the instantaneous propagation of the interacting-fields, the laws for the calculation of the forces of interaction, attain the following expressions:

gravitation (between two ponderable masses, following Newton)	$\vec{F}_G = C_G \cdot \frac{m_1 \cdot m_2}{ \vec{r}(\vec{x}_1, \vec{x}_2, \vec{v}_1, \vec{v}_2, t) ^2} \cdot \vec{e}_{r(\vec{x}_1, \vec{x}_2, \vec{v}_1, \vec{v}_2, t)}$ force of gravitations with a factor of proportionality $C_G = \gamma$ (constant of gravitation)	(1)
Coulomb-forces between two electrical charges [Jac 81]	$\vec{F}_C = C_C \cdot \frac{q_1 \cdot q_2}{ \vec{r}(\vec{x}_1, \vec{x}_2, \vec{v}_1, \vec{v}_2, t) ^2} \cdot \vec{e}_{r(\vec{x}_1, \vec{x}_2, \vec{v}_1, \vec{v}_2, t)}$ Coulomb-force with a factor of proportionality $C_C = \frac{1}{4\pi\epsilon_0}$	(2)
between two magnets (Coulomb’s law of magnetostatics, confirmed by Gauß [Ber 71])	$\vec{F}_M = C_M \cdot \frac{p_1 \cdot p_2}{ \vec{r}(\vec{x}_1, \vec{x}_2, \vec{v}_1, \vec{v}_2, t) ^2} \cdot \vec{e}_{r(\vec{x}_1, \vec{x}_2, \vec{v}_1, \vec{v}_2, t)}$ magnetic force (along the dipol’s axis of symmetry) with a factor of proportionality C_M in relation to the dipol strength p_i	(3)

The only but important difference between the classical approximations in (1,2,3) and the exact consideration of (4,5,6) is the fact, that the static consideration of the distance by the vector $\vec{r}$ is replaced by the dynamic (time-dependant) consideration of the vector $\vec{r}(\vec{x}_1, \vec{x}_2, \vec{v}_1, \vec{v}_2, t)$, taking into account the motions of the partners of interaction as well as the motions of the interacting fields. This means, that the full description of the time dependency is $\vec{r}(\vec{x}_1(t), \vec{x}_2(t), \vec{v}_1(t), \vec{v}_2(t), t)$.

This is illustrated in figure 1. There we regard two electrical charges Q_1 and Q_2 , which interact with each other by Coulomb's forces. Charge Q_1 follows its trajectory $x_1(t)$ in red colour from the top left to the bottom left, and charge Q_2 runs along its blue trajectory $x_2(t)$ from the top right to the bottom right. At the moment t_a , the charge Q_1 passes the position $x_{1,a}$ and the charge Q_2 passes the position $x_{2,a}$. We now regard the Coulomb-force at a moment later than t_a , namely at the time t_b , at which the charge Q_1 is at the position $x_{1,b}$ and the charge Q_2 is at the position $x_{2,b}$. In order to calculate the Coulomb-force at this time t_b , we have to follow the history of the trajectories back to the time t_a . At this time t_a , the charge Q_1 had produced the Coulomb-field being indicated by 8 small vectors, representing flux lines emanating radially from the charge at $x_{1,a}$. We want to follow one of these vector-arrows at its course through space **and** time, seeing that it propagates with finite speed from $x_{1,a}$ to $x_{2,b}$ during the time-interval from t_a to t_b . This is the distance in space and time, which the field of interaction has to pass from $(\vec{x}_{1,a}, t_a)$ to $(\vec{x}_{2,b}, t_b)$, where it meets the partner of interaction Q_2 .

We have to take the motion of the interacting partners into account as well as the motion of the fields of interaction! This is the crucial point (and it makes the application of the laws (4), (5), (6) very laborious). Consequently, at the moment t_b the charge Q_2 experiences the Coulomb-force according to the distance of interaction of $\vec{r} = \vec{x}_{2,b} - \vec{x}_{1,a}$, defined by the dynamic consideration of Coulomb's law as written in equation (5). Obviously this distance of interaction is different from the interaction-distance according to the mere static classical consideration, whose approximation is the negligence of time, namely the negligence of the time necessary for the propagation of the Coulomb-field. In this (simple) classical approximation, the interaction-distance would be $\vec{r} = \vec{x}_{1,b} - \vec{x}_{1,a}$, following the static point of view, as written in equation (2), being symbolized with a green arrow in figure 1. In this sense, the equations (1,2,3) are to be regarded as the static approximations of the equations (4,5,6), the latter one being the exact calculations of the forces of interaction in space **and** time.

Additionally it shall be mentioned: The force, with which Q_1 acts onto Q_2 at the time t_b , is different from the force with which Q_2 acts onto Q_1 at the same moment t_b , so the dynamic consideration of the fundamental interactions (as explained here) introduce a time-shift into Newton's Axiom of „actio = reactio“. Namely Q_2 at the time t_x emitted a field of interaction, which had to pass the distance of the purple arrow, in order to reach the interacting partner Q_1 at the time t_b , so that force and counter-force acting onto Q_1 are not identically the same at the moment t_b . The vectors of both forces differ from each other in their directions as well as in their absolute values. If we want to compare the forces of Newton's „Actio“ ($\vec{F}_{1,2}$) and „Reactio“ ($\vec{F}_{2,1}$) we have to take into account the interaction-forces at different moments of time, introducing a time-shift into Newton's Axiom of „actio = reactio“.

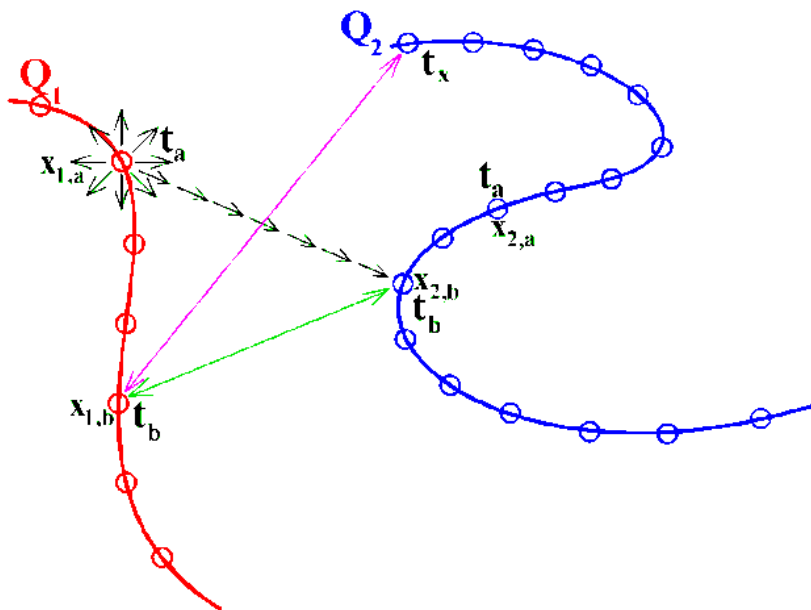


Figure.1: The fundamental interactions in the dynamic view.

The drawing was made in order to illustrate the dynamic consideration of the trajectories of the interacting partners as well the trajectories of the interacting fields.

This has several consequences, among them the following: The classical approximation of the infinite speed of propagation of the interacting fields is quite good in many cases, if somebody wants to build classical engines (without tapping ZPE-energy), but it closes our eyes for the knowledge about the conversion and utilization of the ZPE-energy of the quantum vacuum.

Explanatory statement: In the classical approximation of the infinite speed of the field's propagation, the fields of gravitation, electrostatic interaction as well as magnetic interaction (not for the motion of conductors in magnetic fields) are conservative, and time dependency of the trajectories of the interacting partners are not taken into account at all. When we follow the exact consideration, taking the finite speed of propagation of the fields into account, we have to regard the finite speed of the interacting partners, as well as the finite speed of the interacting fields. This has the consequence, that the speed of the visible partners of interaction and the speed of the invisible fields have to be brought into connection with each other.

We summarize with brief words: In the exact consideration, the forces of Newton and Coulomb do not longer depend only on the positions of the interacting partners, but they depend also on the speed of these partners, which they had even some time earlier than the moment, at which we want to calculate the forces of interaction. According to my knowledge, the first who introduced such considerations into physics have been Liénard and Wiechert [Lan 97], thus the consideration is known under the name of the retarded and advanced potentials of Liénard and Wiechert. (They did it for the special case of the Coulomb-forces between electrostatic charges.)

Newton's and Coulomb's laws (1,2,3) are to be regarded as a static approximation in three spatial dimensions, whereas the laws of (4,5,6) are to be regarded as exact dynamic considerations in four dimensions, namely three spatial dimensions and one dimension of time.

The consequences, which among others allow us to tap zero-point-energy, can be understood as following: Because the forces of interaction do not depend only on the positions of the interacting partners but also on the individual speed of each partner, it can happen that two partners which pass the same positions twice, experience different forces the first time and the second time, when they pass the same positions. This means that the time dependency of the interacting fields make the fields getting rid from being conservative. Consequently, two interacting partners can run along closed trajectories (as shown in figure 2), and when they come back to the starting points, they experience different forces, than what they felt, when they started.

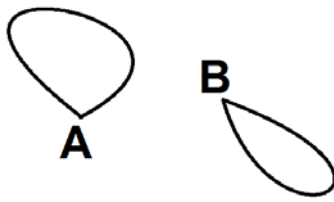


Figure.2: Two bodies are located at the moment t_1 at well defined positions **A** and **B**. Now both bodies follow their trajectories and come back to **A** and **B** at the moment t_2 . Due to the different speed of the motions of the bodies, the forces of interaction are not the same at the time t_1 and at the time t_2 . Of course, the alteration of the force is occurring along the whole time and course of the trajectories. The fact, that the forces do not only depend on the positions but also on the time, has the consequence, that the fields are no longer conservative, as soon as we perform the exact space-time-dependent consideration, leading to the consequence, that the closed-loop path integral $\oint \vec{F} \cdot d\vec{s} \neq 0$ is no longer zero.

The exact consideration of the finite speed of propagation of the fields has a fundamental philosophical meaning within theoretical physics, but it has also very practical applications: It allows us to construct cyclical (periodical and repeatable) motions, along which the energy within the system is different at the beginning and at the end. (This reminds us to the invention of the classical electromotor, but the source of energy is different.) For all fields of interaction follow these rules, the behavior is the same for gravitation, for Coulomb's law and for magnetic dipole-forces.

The difference of energy within the system, which changes from cycle to cycle, is exchanged with an invisible source of energy. And the energy within the system can be enhanced or as well reduced from cycle to cycle, depending on the fact, whether the closed-loop path integral $\oint \vec{F} \cdot d\vec{s} \neq 0$ is larger or smaller than zero. The invisible source of energy is often named with the terminus technicus „zero-point-energy“ (ZPE) – it could be “time-energy” (TE) as well, as Prof. Dr. Nikolai Kozyrev from the Russian Academy of Science did – because the time dependent behavior of the interacting partners and the fields decide what happens.

The fact, that the ZPE-energy can be converted into classical energy but as well classical energy can be converted back into ZPE-energy, demonstrates that ZPE-energy is a fully-fledged type of energy – which must be taken into account within the law of energy conservation. By the way, the author developed a computer simulation of a ZPE-engine, which can convert energy between classical energy and ZPE-energy back and forth. Furthermore he developed the theoretical background of this energy and explained it in numerous publications [Tur 12].

The possibility to construct repeatable closed cycles of trajectories, which behave non-conservative with regard to mere classical energy, is the fundamental presumption for the conversion and utilization of ZPE-energy are created and invented. As soon as the space- **and** time- dependent laws of interaction (4,5,6) are applied, the ZPE-energy of the quantum vacuum has to be included into the law of energy conservation.

2. Development of practical ZPE-devices and ZPE-engines

2.1 First complex of tasks:

In order to develop and construct technical devices on the basis of the theory explained above, taking into account the exact dynamical laws of (4,5,6) instead of the approximations (1,2,3), the author presented some calculation-examples and some demonstrations of the guidelines how to construct such engines. The computing method is called the “Dynamic Finite Element Method” (DFEM). The computation-examples and computer-simulation being developed up to now had had the purpose to demonstrate how to construct ZPE-engines, so that engineers, physicists and scientists can now construct their own ZPE engines as they like.

This method presented as the “DFEM-algorithm”, now has to be further elaborated, namely refined, so that all imaginable mechanical, electrical and magnetical components (visible components of an engine) as well as their interacting fields (i.e. the invisible components of an engine), will be introduced into the computation. Thereby the behavior of all visible and all invisible components within space **and** time has to be taken into regard. The last mentioned (invisible) components are permanently emitted by the first mentioned (visible) components. And the problem has to be solved within the dimensionality of $(x, y, z, t) \in \mathbb{R}^4$, where all trajectories of all visible and all invisible components as well as their interactions have to be followed.

There is a further aspect to which attention has to be paid: For monopoles, such as ponderable masses as well as electrostatic charges, the calculation of the vectors of the field strength and the force can follow the equations (4) and (5) (see figure 3a). The fact, that the interacting partners have the multipole-order of only monopoles, has the consequence that the line connecting the both centres of mass resp. the both centres of charge, is always the axis of symmetry of the problem with regard to both partners, and the force of interaction always acts along this axis of symmetry. Furthermore there is only a translative force, moving the centres of mass respectively charge (translation), but there is no torque giving rise to a rotation of the monopoles. Whereas, for magnetic forces, the situation is much more complicated, because in this case, the lowest multipole-order is not the monopole, but the dipole (see figure 3b). Thus the force according to equation (6) is the very special case of the situation, when two magnets are oriented along the symmetry axis of the problem, which connects the centres of mass of the both magnets at the same time. But this special case is not sufficient for the computation and the theoretical simulation of arbitrary machines. If the both interacting partners (dipoles, magnets) are moving in such a way, that the line connecting their centres is no longer the axis of symmetry of the problem, they experience not only a force of translation of their centres, but they experience additionally a torque, which gives rise to a rotation of the both dipoles around their centres. And those torques have to be included into the theoretical calculations for sure. Thus, the special case of equation (6) has to be replaced by a more universal equation for the magnetic forces.

The further development of the DFEM-algorithm, according to the theory of the dynamic propagation of the interacting fields with finite speed, is one of the main tasks at the very beginning of the construction of a EMDR-converter – one of the very central tasks of every sensible EMDR-project. It is clear in any case, that the theoretical concepts have to be verified experimentally. Therefore appropriate measuring devices have to be built up in order to make appropriate measurements. Goal of this very special part of any ZPE-research work is (as usual), the parallel development of theory and experiment, so that both are developed together, confirming each other, and being refined with the knowledge of each other.

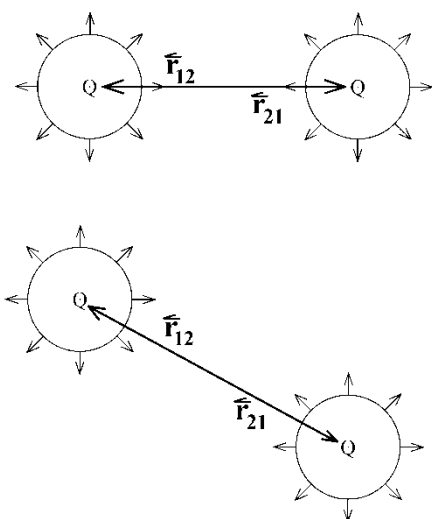


Figure 03a:

Monopoles produce fields with central radial symmetry. Thus, the forces of interaction between two monopoles are always oriented by principle along the line connecting their centres. Consequently, monopoles do not have the possibility to bring each other into rotation around the centres.

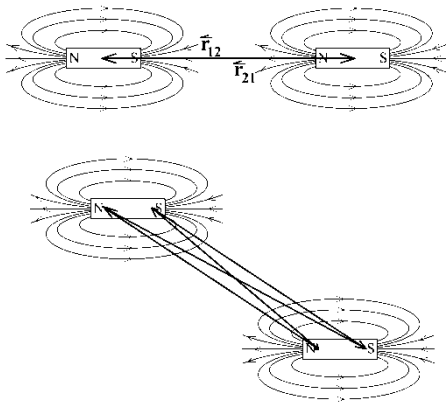


Figure 03b:

Dipoles produce fields with cylindrical symmetry (not radial symmetry). Thus, the forces of interaction are oriented exactly along the line connecting their centres, only in the case, that this line is the symmetry axis of both dipoles and at the same time the symmetry axis of the complete setup.

If the dipoles are oriented differently with regard to each other, so that the symmetry axis of the complete setup is not identical with the symmetry axis of both dipoles (as can be seen in the bottom part of the figure), the total problem does not longer follow cylindrical symmetry. This leads to the consequence, that there is a force of translation and additionally a torque causing a rotation of the both dipoles.

Furthermore: In the general universal case, it is not sufficient, to calculate only the forces and torques between two dipoles, but it is necessary to characterize the reaction of an arbitrary dipole (magnet) on an (magnetic) field with arbitrary field-configuration, such as can be produced for instance by coils.

2.2 Second complex of tasks:

Up to now, the propagation-speed of the interaction-fields has been assumed to be identical with the vacuum speed of light. This is fine, because up to now the demonstration-computations only wanted to illustrate the principle of the finite propagation-speed of the fields.

From now on, for the simulation and the construction of a concrete machine (for the conversion of ZPE-energy), we have to know the exact value of the propagation speed, so we have to measure it. On the one hand, we have to measure the propagation speed of the electrostatic field, and on the other hand, we have to measure the propagation speed of the magnetic field. Therefore we can for instance use a measuring-configuration as shown in figure 4, namely figure 4a for the electrostatic field and figure 4b for the magnetic field.

An electrostatic field can be for instance produced by a parallel-plate capacitor where one capacitor-plate is fixed at the position X_0 and the other capacitor-plate can be moved arbitrarily within the range of the positions $X_{1,2,3,4}$. The (left) capacitor-plate at the position X_0 will then be charged with a short pulse of high voltage at the time t_0 , which causes some displacement of the electrical charges on the other (right) capacitor-plate at the position $X_{1,2,3,4}$. Due to the finite speed of propagation of the electrostatic field, the displacement of the electrical charges on the capacitor-plate at the position $X_{1,2,3,4}$ will happen later than t_0 . The (right) capacitor-plate at the position $X_{1,2,3,4}$ will react at the time $t_{1,2,3,4}$, where we expect $t_0 < t_1 < t_2 < t_3 < t_4$, that the reaction will be the more later, the greater the distance which the electric field has to pass.

For the purpose of estimating the requirements to the measurement, we want to think about the precision of the sensitivity of the necessary time-measurement. The time for the propagation of the field of interaction from X_0 to $X_{1,2,3,4}$ is as usual

$$\Delta t = t_{1,2,3,4} - t_0 = \frac{x_{1,2,3,4} - x_0}{c}$$

If we assume the propagation of the field with the vacuum speed of light, and the distance between the capacitor-plates to be one meter, we come to a numerical value of

$$\Delta t = \frac{1m}{3 \cdot 10^8 m/s} \approx 3.3nsec.$$

This can be seen with a good oscilloscope. But the detection of the electric field must be sensitive enough, to notice a field of for instance 50 kV/m. This criterion can also be estimated exemplarily. If we for instance imagine a capacitor parallel plates having an area of $A=1\text{m}^2$, we can estimate the capacity and the amount of the influenced electrical charge within the right capacitor-plate as

$$C = \varepsilon_0 \frac{A}{d} = 8.854 \cdot 10^{-12} \text{F} \quad \Rightarrow \quad Q = C \cdot U = 4.427 \cdot 10^{-7} \text{C}$$

If a charge amplifier is mounted very close to the detector plate, the detection should be possible. Of course the electronic devices necessary for the detection of the signals, cause some time-delay by themselves, but fortunately this delay is identically the same at all positions of the capacitor-plates $X_{1,2,3,4}$. This should give rise to an offset within the distance-time-diagram of signal transportation (see figure 5), but an offset does not influence the determination of the speed, as being calculated as the time derivative of the position $X_{1,2,3,4}$.

The measurement of the propagation-speed of the magnetic field can be done rather analogously to the measurement of the propagation-speed of the electric field, just replacing the capacitors by coils. Alternatively we have the possibility, to mount one permanent magnet and make it rotate mechanically as illustrated in figure 4b. The time, at which the voltage is induced into the coil, should depend on the distance between the coil and the rotating magnet. In both cases of the measurement of the propagation speed of the magnetic fields, we also have a time-offset coming from the measuring apparatus, but in both cases the time-offset does (of course) not have an influence onto the time derivative of the curve.

Perhaps the measurements of the propagation speed of the electric field has to be performed in the vacuum, in order to exclude influences by the ionization of gas molecules of the air. This problem does not occur at the measurement of the propagation speed of the magnetic field, because the magnetic field does not give rise to any ionization or to electrical breakthrough, like electrical fields do.

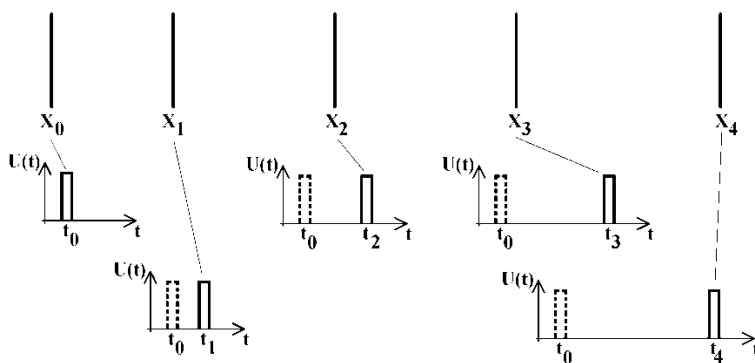


Figure 4a:

Sketch of parallel plate capacitor, from which the left plate is mounted rigidly at the position X_0 and the right plate can be moved in the range of the positions $X_1 \dots X_4$. The larger the distance between the left and the right plate is, the larger the propagation time of the electrostatic field will be.

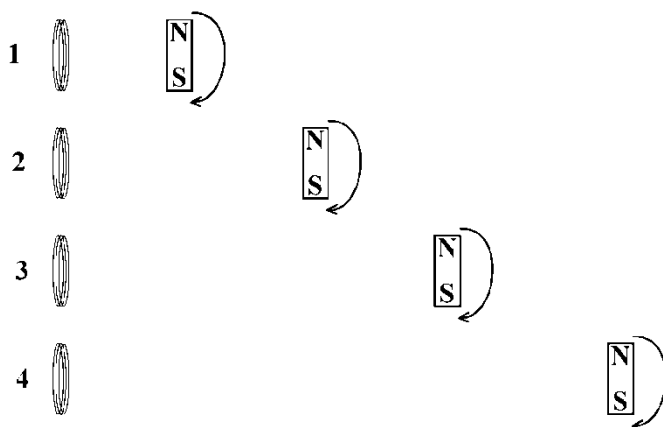


Figure 4b:

In principle, the measurement of the propagation speed of the magnetic field can be done, just by replacing the capacitor-plates of the setup in figure 4a by some coils.

Alternatively the magnetic signal can be produced by a rotating magnet (as shown in the picture here), which will induce an and alternating voltage into the coil.

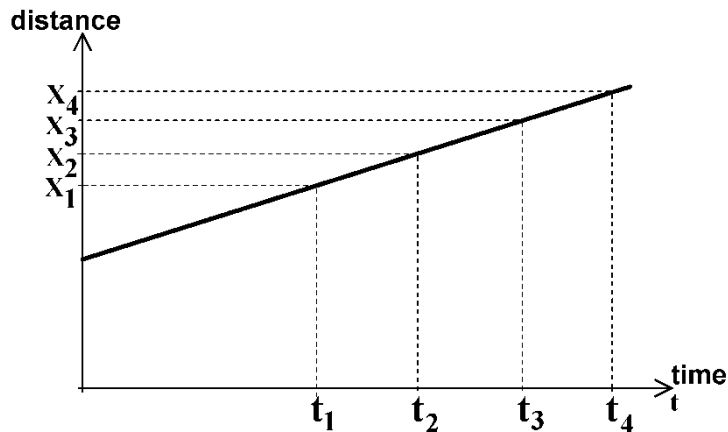


Figure 5:

In the real measurement, the signal-time is caused not only by the propagation speed of the fields, but also by the reaction time of the measuring-setup. The latter one brings an offset into the measurement, which again does not disturb the determination of the slope of the curve.

Just remember again, that the theory presented here, is a very fundamental theory for the explanation of all different types of ZPE-conversion. The theory of the “Field’s propagation with finite speed” is a fundamental basic of physics, explaining that the static consideration of fields in three spatial dimensions, has to be replaced by a dynamic consideration in four dimensions of space and time – in order to fully understand what happens at gravitation or Coulomb-interaction or magnetic interaction.

Not only macroscopic ZPE-motors with electrical or magnetic principles can be explained on the basis of this theory, but also ZPE-converters with chemical functioning principle, as for instance the production of Brown’s-gas with over-unity electrolysis of water. We have to keep in mind, that atoms and molecules are also electromagnetic items, with an atomic nucleus in the middle, producing an electric and a magnetic field, and electrons and the shell, producing also electrical fields due to their presence and magnetic fields due to their motion. Nucleus and electrons interact with each other, and in order to understand the stability of the atoms as well as every chemical reaction, we have to regard the interactions (and their fields) between the nucleus in the electrons. (For more details, see below.)

The first both complexes of tasks being explained up to now had had the purpose to clarify open questions of the fundamental theory, namely the theory of the “Field’s propagation with finite speed”, and its application to the conversion and utilization of ZPE energy.

From now on we focus our attention to a practical example how a real ZPE-converter can be developed and constructed on the basis of this theory.

2.2 Third complex of tasks:

Following the above explained theory of the “Field’s propagation with finite speed” the author has developed an example of a possible ZPE-converter, from which a practical prototype should be built now, especially for the application of technical energy supply. The principle has been elaborated and presented in several publications under the name of the „Electro-mechanical Double-Resonance converter“ (EMDR) [Tur 12]. Because the author does not have any possibilities to build this ZPE-converter by himself, this article here is the suggestion to everybody else (having the technical and scientific preconditions) to do it.

At first we know, that the mechanical speed, with which the hardware parts of a real engine can move, is much slower (by several orders of magnitude), than the speed of propagation of the interacting fields. Thus we have to adopt both speeds to each other, in order to make our theoretical principles applicable. Therefore we can use two possible ways, which we have to apply both, because the discrepancy between the both speeds is too large, to be surmounted by only one activity. Those both possibilities are:

- Retardation of the speed of propagation of the electric respectively the magnetic fields.
- Acceleration of the speed of motion of mechanical components of the machine.

This has the purpose, that both speeds reach the same value, in order to cooperate with each other. Within the author's publications about the EMDR-converter, both possible activities are already taken into account. Nevertheless the given examples are only fundamental demonstrations of the principle how to construct a magnetic ZPE-converter. The numerical values given there, are not designed to be interpreted quantitatively for the direct construct of a machine by machining, milling, and so on. The numerical values are designed same as exercises in the school – just in order to teach how to calculate.

In order to master the way from the computation example to a practical prototype of a ZPE-converter, the computation methods have to be verified by measurements and to be redefined a lot along with the measurements. For instance the principle demonstration only contains a very rough approximation for the numerical value of the inductivity of a coil, whereas the quantitative construction of a real engine needs exact numerical values, being confirmed by measurements. A very important example for the tremendous still necessary refinement of the precision of the computation is the emulation of permanent magnets by single pairs of coils. This is indeed acceptable for a principle demonstration, but the precise distribution of the electrical current-distribution in the real magnet is absolutely necessary, on the one hand for the computation of the Lorentz-forces acting onto the magnet within the magnetic field of the coils, and on the other hand for the computation of the induced voltage and the induced current, which the rotating magnet brings into the coil. Therefore, the permanent magnets have to be brought into a measurement of the three-dimensional vectors of their magnetic field (use Hall-probe or Foerster-probe, which shall be moved by a step-motor under computer control). Together with these measurements, the computer simulation has to be refined, until finally the (additional) control-measurements of the induced voltage and the induced current in the coil confirm the theoretical current-distribution in the surface of the magnets.

Probably, the way from the simple exemplary demonstration-computation (made up to now), to the experimentally verified computation, will arise several questions not yet visible now, making a prognosis of development-time difficult.

As soon as the computer-simulations of the special EMDR-converter are done with sufficient precision, the technical design of the prototype can start. The computer simulation (following the principle by the author) allows not only the construction, but also the technical optimization of the device, on the basis of a scientific fundament, because the theory is valid for all imaginable types of ZPE-converters, and thus of course four imaginable designs of EMDR-converters.

As soon as the construction as confirmed by theory will be fine, a real prototype has to be manufactured by craftsmen, in order to be brought into a real analysis in the laboratory. The first goal of the practical laboratory work will be: Make the EMDR-prototype a self-running motor, being supplied solely by ZPE-energy – and no other energy than ZPE-energy. At the very beginning, as it is usual for normal laboratory-work, the engine should be expected to work in “under-unity” operation, at which the energy-output is even still smaller than the energy-input. Practical losses will have to be identified, for instance such as mechanical friction, electrical resistance, thermal heating, and so on... Therefore we will have to make precise measurements of the input-power, of the output-power and of the power-losses. Probably not only special measuring equipment will have to be bought, but also special measuring methods will have to be developed and be built up, in order to find each energy-sink disturbing the operation of the converter. At this state of the development, the aim is to eliminate as many energy-sinks as possible, so that finally the EMDR-converter can be brought into “over-unity” operation, this is a mode of operation where the classical input-power is smaller than the output-power, which is possible, because some energy is extracted from the vacuum.

But this intermediate goal is only a milestone, not the final result of the investigation. The development has to be continued, until the over-unity will be large enough, that the engine can run by itself (so called “self-running” operation), being completely supplied from the energy of the vacuum. This means that the over-unity of the machine has to be large enough, that the mechanism

bringing back some output-energy to the input of the machine (for self-supply), consumes less energy than the over-unity gains from vacuum, so there will be still some energy and power left, to be submitted to the consumer (for illustration see figure 6).

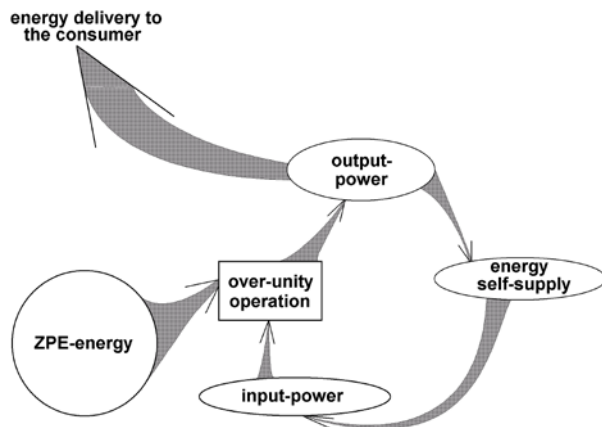


Figure 6: Illustration of a self-running engine being supplied merely by ZPE-energy.

The central device (rectangle) operates in over-unity, the whole setup is self-running, i.e. the central device has a $COP > 100\%$ with regard to visible energy. This is possible, because the energy-input is fed perhaps with classical energy and for sure with ZPE-energy.

From the output, some energy is being brought back to the central device (normally being transported back with a $COP < 100\%$), so that the output can feed the losses in the setup, the central device and the benefit for the consumer. Thus the central device must have a very large $COP \gg 100\%$ (with regard to visible energy).

As soon as this goal is achieved, some practical aspects have to be introduced into the construction, for instance such as security during operation. Some real experience by practical ZPE-researchers has shown, that the conversion of ZPE-energy can run out of control (when it runs), so that the engine might run much too fast, might become too hot (thermal losses) or electrical current or voltage might become too large, and so on . . . – causing a damage of the engine, with the risk to destroy the machine, or even with the risk of an accident. Fortunately, the EMDR principle (in the way how it was presented up to now), already includes several safeguards, so that it does not require principle rearrangements in order to become safe.

Finally the production and verifying of some working prototypes has to be rounded up by practical technology of series production, including price policy as well as robust and stable layout, and many others, ...

3. Utilisation of other systems reported in literature

In literature, we find many different ZPE-converter systems, but none of them is available at the market. This has many different reasons. The technical descriptions of these devices are written in diffuse language and incomplete, so that the readers of these publication and presentations do not have enough information to reproduce the devices for themselves. Nevertheless, we find some rather good partwise information about several ZPE-converters, so that it can be expected, that such systems can be reproduced and built up, if the necessary research will be done.

Of this reasons, and furthermore because different applications need different ZPE-converters (as explained above), the suggestions for scientific ZPE-research work, shall not be restricted only to the fundamental theory, and to the single example of the ZPE-energy converter, as described in section 2. It is rather recommendable, to analyze, investigate and develop many different ZPE-systems. Some candidates within the list of hopeful ZPE-systems will be under consideration in section 3. Everybody can prolong this enumeration as she or he likes.

A serious disadvantage with regard to the observation of ZPE-literature is the fact, that the available publications and informations do not fulfill the typical standard of scientific literature, but they rather turn out to be reports of empirical experimentalists, who never had a sufficient theoretical understanding within the range of accepted physics or engineering science. In the field of ZPE-research and ZPE-publications, we live with this disadvantage, and thus we have to accept, that style and design differ from typical scientific publications. We can feel irritated by such a disadvantage, but I prefer to give this disadvantage only minor importance, because I do not want to lose the

knowledge, which can be found in such not-professional ZPE-publications (from outside the scientific mainstream).

In order to illustrate my words, I now want to refer exemplarily to the so called Coler-converter, to give the reader a feeling for a nonprofessional presentation, as it can be found at the Coler-converter. This device has been invented in the 1920s by Hans Coler, who was captain at the German Marine at this time. He invented this converter with the aim to supply Submarines with ZPE-power. Unfortunately he did not know the usual scientific terminology at all, so that scientists could not understand him at this time. The consequence is, that today we only have a report by the English Secret Service made in the Second World War [Hur 40], who tried to understand Mr. Coler in the 1930s and 1940s. But due to a lack of scientific terminology, the understanding is very fragmentary, and it kept like this until today, so that we cannot reproduce Coler's work today [Nie 83] and [Mie 84,87]. Nevertheless it is sure that Mr. Coler had had to different types of ZPE-engines, which he called „Stromerzeuger“ and „Magnetstromapparat“. And it is for sure, that both engines had a $COP > 100\%$ (with regard to classical visible energy), because Coler demonstrated his machines to several professors at the universities of Berlin, München, Trondheim und Kopenhagen. Even none of these colleagues could understand Coler's terminology, although all of them saw his engines in operation. The colleagues inspected and tested the Coler's engines and nevertheless they did not understand, how the engines work. (The adjustment-procedure is very complicated.)

On this background, the functionality of the Coler-engines as ZPE-converters is verified, but due to the problem, that nobody could understand them, they came into oblivion and after some time into discredit (like a fairy tale), so that finally the scientific community rejected Coler's work at all. As a consequence, today's literature makes Coler's work more or less ridiculous, and we do not have any scientific document at the usual standard. For this reason, trials of reproduction of Coler's work have been successless, as for instance by George Hathaway (1981), presented at the Canadian „First International Symposium on Non-Conventional Energy Technology“, and many others. Further information can also be found at [Geo 10].

Certainly the lack of professionalism and scientific documentation is the large problem and a serious deficit of such types of ZPE-work outside the established scientific institutes, but it would a pity to lose the complete store of knowledge and results only because of the non-professional design of the documentation. Thus I decided to include also such ZPE-systems into my scientific consideration which do not have the typical usual publications, even if the literature references do not fulfill the normal standard. I ask the readers of this article, to accept this approach, just in order to help an unseen treasure of knowledge, to find its way into the disciplines of Physics and Engineering Science. For this reason, we now want to turn our attention to several ZPE-systems reported in literature, if the scientific reproduction and preparation seems sensible.

Additionally, this approach leads us to the possibility, to investigate several different ZPE-systems in parallel, with the great advantage to help for quick utilization of ZPE, because the series-production can begin already as soon as the very first ZPE-method will be realized in the laboratory. I evaluate this advantage more worthwhile than the disadvantage of excluding layman-style publications from scientific activities, even if this disadvantage reflects somehow on the following pages.

For nowadays the field of ZPE-research is extremely dynamic, the concrete begin of scientific work shall start with a literature-inquiry, in order to collect information about the most hopeful ZPE-systems already under trial – and in order to find answers to open questions, which are not yet answered at the EMDR-system. This can also help to bring results about the EMDR-system of section 2 more fast.

Some of the hopeful ZPE-systems known from literature are reported on the following pages. They could be a basis for empirical approach of the reproduction of referred ZPE-systems.

3.1 Motionless-converters:

Motionless-converters are ZPE-systems without mechanical parts in motion. The only items in motion within such converters are the fields of interaction (electric and/or magnetic fields) which propagate with a finite speed (perhaps the speed of light). Such systems should be understandable, with the "Theory of the finite speed of propagation of the interacting fields" most easily, because we do not have to follow any trajectories of any mechanical parts, but we only have to follow the trajectories of the interacting fields. This makes computations most easy. Furthermore, motionless-converters have many practical advantages, such as very low abrasion and very low deterioration, very good durability and very low noise (in the ideal case no noise at all) and no mechanical vibrations, disturbing other technical engines being supplied with power.

Examples for such devices (reported in literature) can for instance be some very special transformers, driven by electrical signals of very short pulses (low pulse-pause-relation), which can produce more electrical power at the secondary coil, in comparison with the power being supplied at the primary coil for their operation. An example therefore is the Marinov-converter, invented by Prof. Dr. Stefan Marinov at the University of Sofia (Bulgaria). The input-power can be taken from an accumulator, being modulated by an electronic circuit and then fed into the primary coil in such a way, that the secondary coil gives more power-output then the accumulator has to deliver. Under good adjustment of the system parameters, the converter can run as a self-running transformer, giving some additional power to any consumer.

Unfortunately, Prof. Marinov did not write a good documentation, but he committed suicide, so that we do not have a serious amount of useful information in literature today. Prof. Marinov presented his work to a colleague at the University of Vienna. From there we have a very small hand sketch, from which a copy is printed in figure 7 [Hor 10].

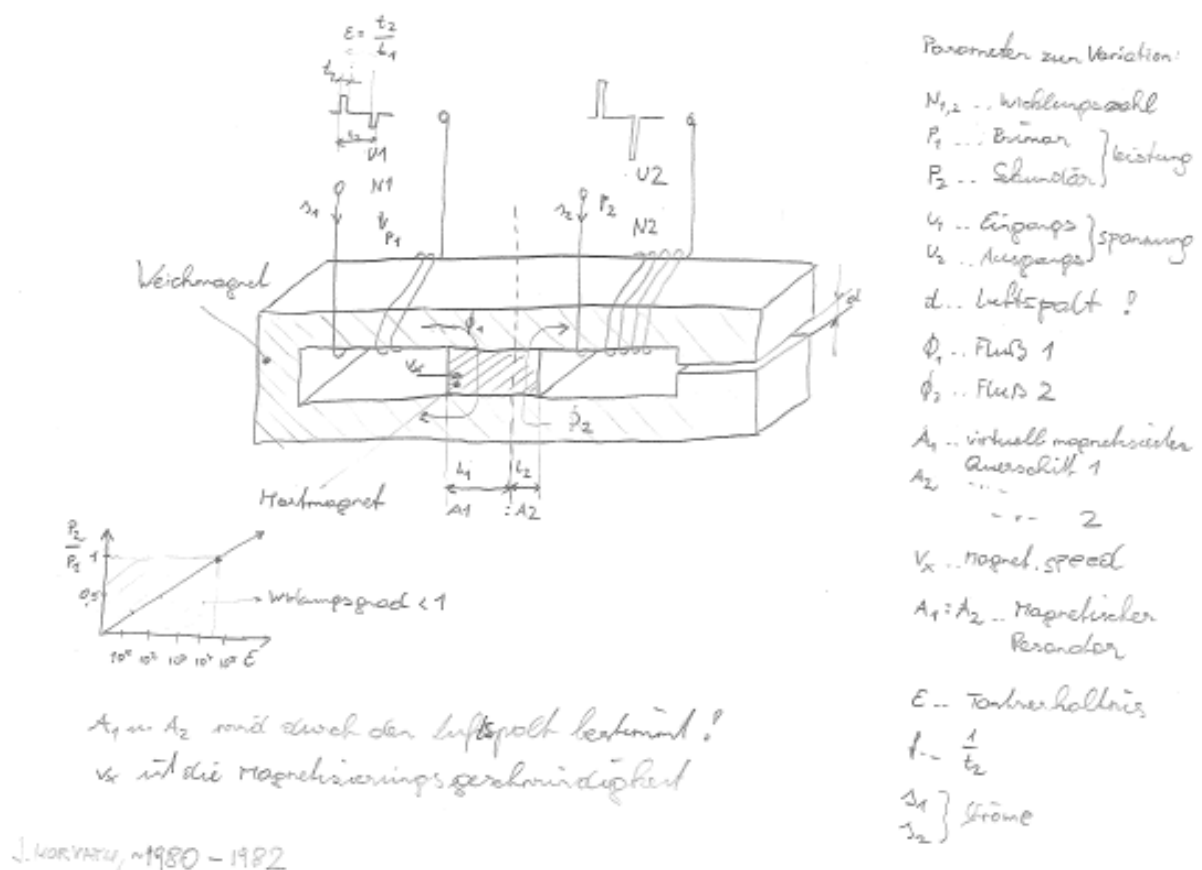


Figure 7: Hand-sketch of the working principle of the Motionless-converter by Stefan Marinov.

The hand-sketch can be downloaded in high-resolution and good printing quality for free at:

<http://www.ostfalia.de/export/sites/default/de/pws/turtur/FundE/English/MLMC2.pdf>

The primary coil is supported with bipolar short-pulsed signals, producing bipolar short-pulses of a magnetic field, magnetizing a Bariumferrit magnet within the yoke back and forth. A very thin air-gap within the yoke is not yet completely understood. The fact, that Bariumferrit can display an over-unity effect when being magnetized back and forth, is known from the patent DE3501076A1 from 17.07.1986 (Title: „Energiewandler mit Magnetkernzwischenspeicher“) by Dr.-Ing. Wolfgang Volkrodt, where the magnetic pulses, driving the magnetization back and forth, have to be extremely short (few Nanoseconds).

In meantime, the engineer Herbert Schnelzer was reported to have a successful reproduction of the setup, and several oral reports have been given, confirming that his ZPE-device was converting ZPE – energy, even under control of the official TÜV in Munich – but there is no documentation available any further, because Mr. Schnelzer committed suicide, and his widow says, she does not have any documents any further. So the statements are not confirmed today anymore.

Clear it, that the pulses driving the Marinov-converter must be extremely short, in order to get a self-running transformer. And also clear is, that the permanent magnet inside the middle of the yoke must have a very small hysteresis loop in order to make the losses of $w = \int B \cdot dH$ as small as possible.

From there we derive the following steps of research and development of the Marinov converter:

Generate very short pulses (few nanosec.) of a strong magnetic field (~2 Tesla) in a coil

Find a ferritic magnet (such as for instance Bariumferrit, Strontiumferrit, or similar), which can be magnetized back and forth to saturation with over-unity. (Experimental verification is necessary.)

- Introduce this magnet into a yoke, which transports the magnetic flux from the coil directly into the ferritic magnet, to minimize flux-loss by stray-fields.
- Find an appropriate primary coil according to figure 8, in order to bring the necessary magnetic field into the yoke, so that the ferritic magnet will be magnetized into saturation in both directions. (-> see Figure 8: First step of development)

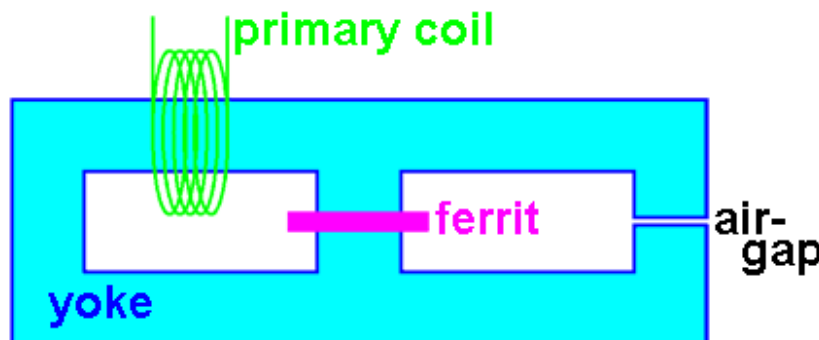


Figure 8:
Illustration of the setup
for the very first step of
development of the
Marinov-converter.

- The coil has to be supplied with extremely short current-pulses coming from a capacitor, which has to be large enough to bring enough electrical current into the coil fast enough, to magnetize the ferrit within few nanoseconds.
- The connection of the coil with the capacitor has to be realized with an extremely fast electronic switch (or with some appropriate electronic circuit) to make the pulses as short as necessary (see figure 9).

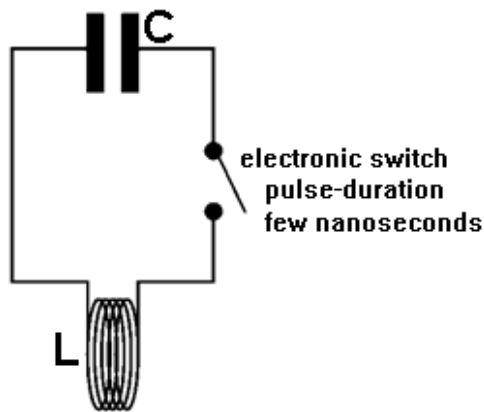


Figure 9:

Example for an electronic switch, which can be closed for a very short moment in order to get short pulses into the coil.

Way of operation:

- At the very beginning, the capacitor is charged completely, and the switch is open.
- Now the switch is closed for few hundred nanoseconds or even for few nanoseconds only, so that the capacitor sends an electric current into the coil.
- After the nanoseconds passed by, the switch is opened immediately.

Investigations might show, that perhaps the pulses shall be even shorter than written in figure 9. The signal shape is also not yet clear (see also figure 10).

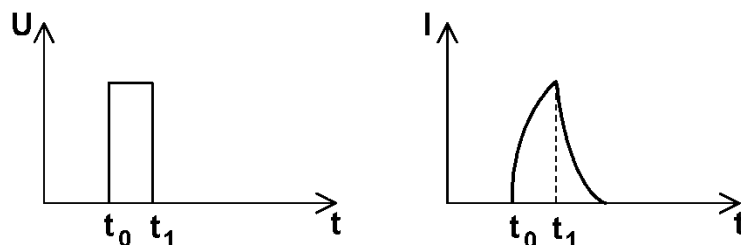


Figure 10:

Voltage and current at the coil

Perhaps we might find the typical discharge behavior of a capacitor – or something different ?

The layout must be dimensioned in such a way, that the field strength is sufficient for saturation of the ferrit, even if the pulses are as short as few nanoseconds. But for the purpose of investigation, an adjustable signal-length from several nanoseconds to several microseconds must be provided.

Check, if the field-strength is strong enough:

With a Hall-probe, the magnetization of the ferrit can be measured before and after the magnetization procedure. This must confirm the saturation in both directions with bipolar operation.

Magnetization with different duration oft he pulses:

The bipolar saturation-procedure of the ferrit has to be repeated with several different pulse-shapes. Series of measurements have to be performed with pulses of

- different duration,
- different voltage amplitudes,
- different current amplitudes,
- different signal-shapes.

The measurement series have to be evaluated with regard to the energy contained in single pulse, causing the saturation of the ferrit. This has to be done with a fast digital storage oscilloscope. The evaluation of the data then follows the typical formula

$$E = \int U(t) \cdot I(t) dt = \lim_{\Delta t \rightarrow 0} \sum U(t) \cdot I(t) \cdot \Delta t$$

Thereby it shall be found, how the magnetization-process has to be made, so that the magnetization to saturation can be done with a minimum of energy consumption.

Extraction of energy from the system

After the knowledge of the patent by Dr. Volkrodt, we expect that the optimum pulses for energy-saving reversal of the saturation magnetization will be very short. And now we have to find a way, how to extract the maximum of energy from the reversal of the saturation magnetization of the

ferrit. Therefore, Stefan Marinov mounted a secondary coil as being drawn in figure 11. The secondary coil must be much slower than the primary coil, which can be achieved for instance by an appropriate number of windings (to be investigated).

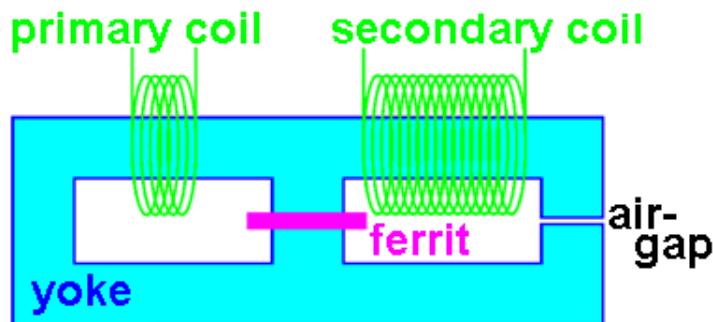


Figure 11:

A secondary coil as added to the setup of figure 10, in order to extract energy from the system.

The COP of the converter is being determined by the comparison (the fraction) of the energy-contents of an output-pulse with the energy-contents of an input-pulse. This energy-contents is being found as usual:

$$E = \int U(t) \cdot I(t) dt = \lim_{\Delta t \rightarrow 0} \sum U(t) \cdot I(t) \cdot \Delta t$$

Long-term operation of the over-unity engine

As soon as the COP is larger than 100% with regard to classical electrical energy, over-unity is found. Then the converter must be brought into enduring operation by supplying a permanently repeated series of pulses into the primary coil.

Leading back the energy to the input, self-running transformer

As soon as the engine can operate with long-term over-unity, the energy from the output has to be given back to the accumulator at the input in order to make the systems self-running. An electronic circuit must be developed, which separates the energy necessary for the self-supply of the setup on the one hand, from the energy which can be given to consumer on the other hand.

Additional remark:

Perhaps it might turn out that it is useful to replace the yoke by some other shape of material, in order to minimize the losses within the yoke. This can be for instance a setup like in figure 12.

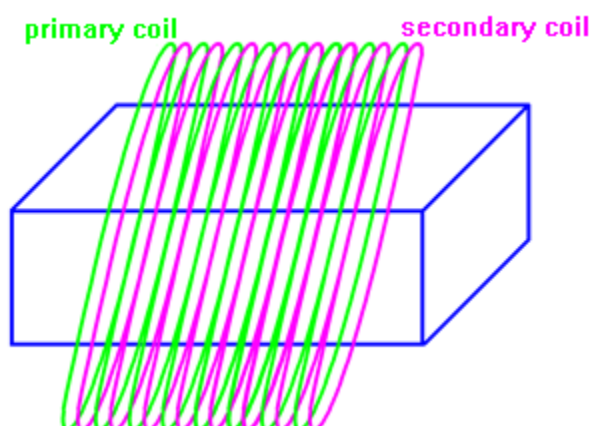
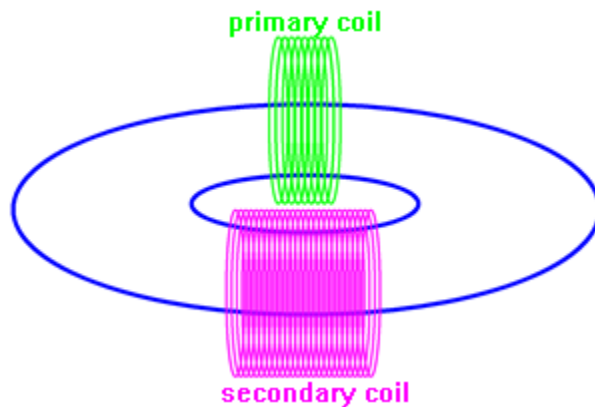


Figure 12:

Example for possible alternative setups in order to minimize the losses of magnetization. Arbitrary geometry is imaginable.



At the end of the development, a low-priced series production, taking the security of operation into account and several other practical aspects, must be done in any case.

3.2 Chemical Systems:

Rhetorical question: Can chemical ZPE-converter systems be traced back to the theory of the finite propagation speed of the interacting fields ?

Answer: Hopefully – yes. But it will be a lot of theoretical work.

Reasoning: Atoms and molecules consist of particles (namely protons, neutrons and electrons), which are kept together by electric and magnetic fields, so there are fields, which determine the behavior of the components of the atoms and molecules. The positive charge of the atomic nucleus produces a Coulomb-field, which keeps the electrons in the atomic shell. Furthermore the atomic nucleus has a magnetic moment. The energy of the electrons within the shell of the atoms can be calculated with the rules of quantum theory, but there is an inner contradiction within the view of this theory: The electrons follow their way on their orbits around the nucleus, so there must be a centripetal acceleration, to avoid that the electrons will fly away centrifugally. This means that the electrons are accelerated electrical charges, and we know from electrodynamics, that accelerated charge emits electromagnetic waves. And electromagnetic waves transport energy with themselves. The consequence is, that the electrons permanently emit energy, and thus they can not stay on their orbits. Finally this would mean, that stable existence of atoms would be impossible. But from everyday's life we know, that this is nonsense. The discrepancy is described in many textbooks of physics, but normally we read just the hint, that this doesn't happen and nobody knows why ?!?

The solution of this problem of course can be found within the zero-point-energy of the quantum-vacuum. This is one of the statements of the theory of "Stochastical Electrodynamics" (SED). One of the most prominent scientists, working on this theory, is Timothy Boyer from New York University, who wrote numerous publications about this topic in Physical Review and other journals, in which he derived almost all important results of quantum theory without using the formalism of quantum theory at all, but by the use of the formalism of Stochastical Electrodynamics. The thoughts of SED can be summarized briefly as following:

Of course the electrons emit radiant energy, when they run on their orbits around the atomic nucleus. Namely they emit electromagnetic waves exactly according to the theory of electrodynamics as we expect it. On the other hand, the electrons are permanently supplied by zero point energy from the vacuum, with the consequence that they can keep their energy and orbits. Stable discrete energy-levels, as we know them from quantum theory, are exactly those levels, at which the electrons are supplied with ZPE-energy from the vacuum, in equilibrium with the energy being necessary for the emission of electromagnetic waves according to classical electrodynamics. A long list of literature references by Timothy Boyer can be found at [Boyer 66..08], and at [Boyer 80], [Boyer 85].)

A continuation of his thoughts is made by the highly respected scientific group of the “Calphysics Institute“, leading to considerations about the utilization of the ZPE-energy of the quantum vacuum, as it would be for instance necessary for deep space travel [Cal 84..06].

The central basic assumption of SED is the postulate, that the zero point oscillations of electromagnetic waves of the quantum vacuum (which had been introduced into Physics as one of the results of quantum theory) **exist**, and that their spectrum defines the ground state of the free electromagnetic radiation of the mere vacuum, which is called the vacuum-level. All further assumptions or statements of quantum theory are not needed at all.

If we now regard the behavior of the zero point radiation and its interaction with the matter of our world, we find that all of this matter permanently absorbs the radiation of the zero point oscillations of the electromagnetic waves and that this same matter permanently emits the same type of radiation, because also every elementary particle does its zero point oscillations (known as “Zitterbewegung” – a German word even in the English literature). Based on this assumption, the theory of SED is capable to explain all known phenomena of quantum theory, without touching its assumptions at all. Historically one of the first results of SED was the explanation of the black body radiation with its characteristic spectrum, as a function of the temperature due to the motion of the elementary particles. The next historical explanation of SED is the photo effect, fitting without any problems into this theory. One of the prominent results of quantum theory, the explanation of the stable orbits and levels of the electrons in the atomic shell, was also calculated by SED as explained above. Therefore the energy emitted by the circulating electrons, has the same amount as the energy supplied by the zero point waves of the quantum vacuum the those electrons. Within SED, an analogy of this behavior to Bohr's postulates No. 1 and 3 can be explained. The equilibrium of the energy of absorbed and emitted radiation according to SED, explains exactly the discrete energy levels of the electrons in the atomic shell.

Not only the results of quantum mechanics (QM) are explained within SED, but also the results of quantum electrodynamics (QED). The list of the results of SED (confirming QM and QED) has many well known contents, such as for instance the Casimir-effect, van der Waals forces, the Lamb-shift and Heisenberg's uncertainty relation.

For the sake of correctness it must be again noticed, that SED of course gives explanations for the phenomena of nature on its own, not trying to reproduce the calculus and the methods of quantum theory. On the one hand, the Schroedinger-equation, as typical formula of quantum theory, can not be derived with the means of SED, but on the other hand the typical equations of SED can not be derived with the means of quantum theory. In this sense, SED on the one hand and QM+QED on the other hand are two independent philosophical concepts explaining the same phenomena of nature, with the curiosity, that they describe the same phenomena in different way. So we cannot decide, which theoretical concept is correct and which one is wrong, but we just know, that we face two different philosophical concepts with equal “value of application”.

Of course, SED is not as widespread as QM+QED, and it is not as elaborate as much as QM+QED. But nevertheless it appears sensible, to go back to SED in the in order to understand, how to extract energy from the zero point oscillations of the vacuum - which indeed arises hope for promising results, because it is the zero point oscillations, which form the central fundament of SED.

In this sense, we can describe the relationship between SED and QM+QED provocative as following: Basic fundament of all phenomena of nature (under consideration here) is, what both theories use in the same way - and this is only the existence of the zero point oscillations of the electromagnetic waves in the quantum vacuum, with brief words the ZPE-waves. On this basis we have two different philosophical concepts, a fact which SED accepts explicitly, but most users of QM+QED are even not explicitly aware of this fact.

From this knowledge we accept, that all atoms and molecules permanently interact with the zero point waves (and their energy) within the quantum vacuum. And from there, we arise the question,

whether the theory of the finite propagation speed of the interacting fields, can explain the binding mechanism of the atoms being kept together to molecules in chemistry – when we look to the finite speed of propagation of the electric and magnetic fields keeping the atoms together to molecules. If this explanation can be made possible, we will not wonder, if ZPE-energy plays a role within chemical reactions, making ZPE-conversion possible by appropriate chemical reactions.

Although up to now, the theory of the finite propagation speed of the interacting fields has not been applied explicitly to this question, from literature we know about chemical systems, of which the chemical reactions can convert ZPE-energy. According to the state of literature (see below) the electrolysis of water (making Brown's gas) can be brought into over-unity operation, by using very short pulses of electrical signals, introducing the energy for the electrochemical electrolysis dissipating water into hydrogen and oxygen. Under appropriate conditions, it should be possible according to literature, to bring much more chemical energy out, than we have to put inside with the electrical pulses. From this knowledge, we now face two further tasks of ZPE-research, namely on the one hand the experimental reproduction of the electrolysis as described (or some other appropriate chemical reaction with ZPE-support), and on the other hand the development of the theoretical explanations of such reactions, on the basis of the theory of the finite propagation speed of the interacting fields or on the basis of SED.

First complex of tasks : Electrolysis (of water) in over-unity

- Pulsed synthesis of hydrogen, for instance by electrolysis of water. Under very special conditions, which still are not generally known yet, the electrolytic dissipation of water molecules (following the reaction $2 \text{H}_2\text{O} \rightarrow 2 \text{H}_2 + \text{O}_2$) can be organized in such a way, that the chemical energy of the products of the reaction, is larger than the electrical energy necessary for the reaction. The gas being produced by such an electrolysis is known under the name Brown's Gas, and in reality (different from the chemical formula as written above) it is not simply $2\text{H}_2 + \text{O}_2$, but it also contains some amount of atomic hydrogen and oxygen, not sticking together to molecules.

Thus the separated oxygen and hydrogen can be burned (thermally as well as in a fuel cell) delivering more energy than its production afforded. A closed-loop cycle, with electrolysis of water and burning the products ($2 \text{H}_2\text{O} \rightarrow 2\text{H}_2 + \text{O}_2 \rightarrow 2 \text{H}_2\text{O}$) can be developed, beginning with water and ending with water, producing classical energy by extracting some energy from zero point waves of the quantum vacuum – which is clear at least because there is no other visible source of energy. The inventors of such ZPE-converters do not give all the details of their inventions (due to confidentiality reasons), but it is clear that pulsed DC-current is the key to the success.

By the way it must be mentioned, that it is already possible, to buy commercial welding apparatuses working on this principle with Brown's Gas. But the chemical reaction, when Brown's Gas is burning, is much more than only $2 \text{H}_2 + \text{O}_2 \rightarrow 2 \text{H}_2\text{O}$ (even if we do not yet know the complete story). There is for instance the observation that the flame burns with about 150-200 °C if we do not touch it, but as soon as the flame touches matter, it produces temperatures of many 1000 °C, making it possible to weld not only steel but even stone. This can not be explained only by the reaction of $2\text{H}_2 + \text{O}_2 \rightarrow 2 \text{H}_2\text{O}$.

An enumeration of addresses, where Brown's Gas generators and welding equipment can be bought, is to be for instance found in the book [Sac 10], which also explains a historical background and several further features of Brown's Gas. Among others, there are also systems which mix Brown's Gas into the cylinder (together with air and fuel) in the automotor, reducing the fuel consumption by 30-50% (possible for diesel-engines as well as for benzine-engines).

Research for the optimization of the COP of the pulsed electrolysis (for instance of water) is to be performed, making measurement series with different pulse-shapes, different frequency, different pulse-pause relationship, different geometry of the electrodes, different catalyst-substances within the water, the material the electrodes, and so on ... Probably a frequency of many megahertz or

several gigahertz will be necessary, and the electric signals have to be produced by electronics circuits very energy-efficiently, in order not to spoil the COP of the whole system. At first it is interesting to make measurement series for the economical optimization of the Brown's gas generators, but on long-term it is necessary to develop the theory behind the over-unity chemical reactions, being supplied by the ZPE-energy of the vacuum. Hopefully, these theoretical explanations will be possible on the basis of SED or on the basis of the theory of the finite propagation speed of the fields, being applied to the chemical binding of the atoms to molecules.

Second complex of tasks: The cristal cell – a solid-state battery without electrolysis

- Another chemical system is the so called crystal cell, which looks rather similar to a normal battery from outside, but which has the advantage not to discharge over years or decades of years under operation. It behaves like a never ending battery, producing energy without the necessity of being charged like an accumulator. The author once tested a crystal cell by making a short circuit by just connecting the plus and minus pole with a copper-wire with each other for several months. After taking away the copper-wire, the crystal cell recovered within less than one hour, and then it behaved like a fresh brand-new one. One experimentalist reported, that he drives his electrical clock in his kitchen now for nearly 20 years, without touching the crystal cell at all - no charging - nothing.

Up to now, chemical analysis of the crystal cell was hardly done and is not found in literature. The main problem of crystal cells is the very low power density, giving only a few Milliwatts per litre volume (in the crystal cells as we have them already today). This might have the reason that systematic optimization simply has not been performed at all, because there is even not yet any such investigation being reported in literature. (At least the author could not find any such report.) The actual research on this system can start up with the clarification of the chemical process in the inside of this system under operation of the system. The goal is of course the idea to enhance the power density to allow technical and economical application, as for instance the power supply of mobile phones, laptops, electrical watches and pocket calculators, and so on, ...

A possible way for the manufacturing of crystal cells is reported in literature, by mounting copper discs on a brass shaft, and then putting the setup into an Aluminum-tube (see figure 13) together with a crystalline substance, which can for instance consist of quartz-powder, cliff-powder, marble-powder in vinegar or acetic acid. The Aluminum-tube will then be the minus-pole and the brass will be the plus-pole, without any electrolysis-reaction. Electrolysis is driving normal batteries and accumulators but not the crystal cell, which we can say, because the substance within the crystal cell hardens at the manufacturing process, and there is no liquid inside. Furthermore it is observed, that during (1-2) decades of years, there is no electrochemical corrosion of the components and no ageing of the metal surfaces.



Figure 13: Crystal cell when being mounted in the laboratory of an experimentalist [Har 12].

I want to express my thanks to Guy Hary, Luxembourg, for giving me the pictures to be used in this publication.

Different experimentalists work with different mixtures to fill the crystal cell, and some of them keep their mixtures secret. Substances like calcium-powder or graphite-powder in acetic acid are reported. They are brought into the crystal cell in liquid condition, and some of the mixtures can produce rather much temperature when they harden, so that the aluminum-tube becomes too hot to be touched by hand. After hardening, the operation can start, and during the operation of the cell, there is no liquid, which can play the role of an electrolyte.

After the filling substance is hardened, a typical voltage in the range of 1.0 ... 1.5 Volt can be measured (with optimum setup), but during the time of operation, the voltage decreases somehow. A short disconnection of the consumer allows the crystal cell to recover within few minutes, and it will behave like a completely new crystal cell after this recovering time. This regeneration can be repeated arbitrarily often, always in the same way. And for this regeneration it does not play any role, how long and how strong the crystal cell had to work, before this regeneration.

For the optimization of the power density, probably a systematic variation of the geometry of the setup, has a rather high priority. Nevertheless it should be expected that the development of chemical knowledge will help to maximize the power density remarkably. A still open question is, in how far chemical knowledge can be traced back to the theory of the finite propagation speed of the interacting fields as explained above. SED should also be taken into account in this context.

Third complex of tasks : Bedini-Motor

John Bedini developed a ZPE-engine with a rotor containing several magnets, which pass by near several coils, when the system is in operation (see figure 14). The rotor is driven with the electric power of a (primary-)accumulator, but it is said that it produces enough electrical output-power, to charge up two or even three (secondary-)accumulators of the same type (as the primary one), as long as one such accumulator is discharged. In this sense, the Bedini-motor is said to be a ZPE-generator, with a COP of 200 ... 300% with regard to classical electrical energy, within the accumulators.

One problem is, that the Bedini-engine does not work 100% reliable, but in some cases it does not work as a ZPE-converter at all, for in these cases, it only consumes some classical energy, to surmount friction and other losses. Mr. Bedini sells assembly-kits of his converter, but his clients can never be sure in advance, whether they will be able to bring it into operation or not. The reason for the lack of reliability of the system is not yet known - but in these cases where it works, it is a very convincing demonstrating example, that ZPE-energy can be utilized.

It seems that the rotation of the magnets with regard to the coils is not the responsible mechanism for the operation of the Bedini-converter, but the signal shape of the electrical voltage and current to charge the secondary-accumulators define the responsible mechanism for ZPE-conversion. This explanation comes from the fact, that in meantime Bedini himself managed to build a version of his converter-system, without any components in motion, by only using an electronic circuit to produce the electric pulses, necessary for the over-unity charging procedure of the secondary accumulators. From there we get the impression, that the over-unity (if it is present) has its reason within the chemical reaction during the charging-procedure of the accumulator. Due to this finding, Bedini's accumulator-charging-procedure is enumerated here among the chemical ZPE-conversion methods. It should be mentioned: Not all accumulators can follow Bedini's charging-procedure, some types of accumulators can not.

By the way, it is known that normally Bedini's accumulator-charging-procedure enhances the fatigue life of the accumulators remarkably, in comparison with classical charging-procedures using DC-current. In some cases, even old accumulators, which are said not to operate properly any further, can be repaired by the use of Bedini's accumulator-charging-procedure.



Figure 14: Photo of a reproduction of a Bedini-Generator by [Har 12].

I want to express my thanks to Guy Hary, Luxembourg, for giving me the pictures to be used in this publication.

The main problem of Bedini-system is, that its reliability is below 100%. After Mr. Bedini has sold very very many of his experimentation-kits since lots of years, the functionality of his system is confirmed even by many Hobby-experimentalists and so there is no doubt, that the Bedini-system is a serious converter of ZPE-energy [Pan 12]. But his explanations do not yet fit into the officially accepted theory within physics, and thus his ZPE-converter is ignored by almost all colleagues within the scientific community. In order to help the system to be accepted, it would be necessary to develop a

theoretical explanation of his working-principle within established physics, and probably such an explanation would also help to get rid of the problem of reliability below hundred percent.

- Of course it would not be a problem to regard several additional further ZPE-systems described in literature, but independently from such a literature inquiry, the description presented here, already provides enough work for scientific investigations, to enter the research of chemical ZPE-systems.
- Also the number of suggestions for the investigation on magnetic and electrostatic ZPE-systems could be enhanced. But also in this area, there is enough work being already defined, so that a further diversification is not necessary at the moment now, because the open tasks are for sure sufficiently enough, to suggest many possibilities how to begin the research of such ZPE-systems.
- The main aspect of all considerations, within all ZPE-activities suggested here, is the assembly of a working ZPE-prototype, with the clear interest to bring it to series production as fast as possible. Nevertheless the amount of work still to be done, shall not be underestimated.
- The immense plurality of the different ZPE-systems referred in literature, can be understood, from a classification system of ZPE-converters as being presented in the book „Die Urkraft aus dem Universum“ von Klaus Jebens [Jeb 06]:
 - Magnetostatic ZPE-converters
 - Magnetodynamic ZPE-converters (where we also find Turtur's EMDR-converter)
 - Electrostatic ZPE-converters (where we also find Turtur's electrostatic rotor)
 - Electrodynamic ZPE-converters
 - Special types, such as for instance chemical systems
 - Exotic systems, such as for instance
 - Direct utilization of Casimir-forces [Cas 48] (non-conservative cycles at microscopic motions are expected to be possible in connection with the application of special materials together with special surfaces [Cou 99]).
 - Flashes of lightning in very special crystals can under certain circumstances produce more energy than their generation consumes.
 - The „Repulsine“ by Viktor Schauberger, a system using special vortices within water flow, accelerating the flux with the help of an over-unity effect. It can be for instance utilized in a closed volume of very a special geometrical shape under high pressure to build a self-running engine [Prc 10]. Unfortunately the references do not enable more information here.
 - And many many others

The benefit of ZPE-research:

ZPE is a new source of energy, free from combusting matter, free from environmental pollution, without any problems to health, inexhaustible (we have as much as the size of the universe defines), and extremely low in price (only the engines have to be bought, but the ZPE-energy is for free).

From where does the ZPE-energy originate ?

From the quantum vacuum. If we utilize this energy, we alter the curvature of the four-dimensional space-time, but the alteration goes with the speed of light into the universe and is being dispersed along the whole universe, so nobody will feel it.

Cheap ZPE-energy will give rise to tremendous economic advantages, because about 80% of the world's industry, is energy consuming, and will be very glad about very cheap energy – same as private people with their houses and cars being fed with very cheap ZPE-energy. But first of all we

have to save our environment by the use of ZPE-energy in order to keep our planet clean for following human generations.

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