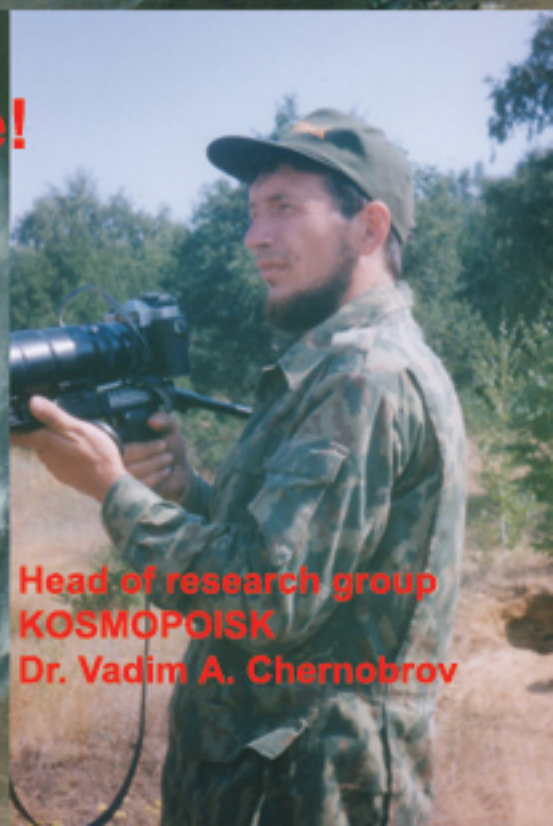
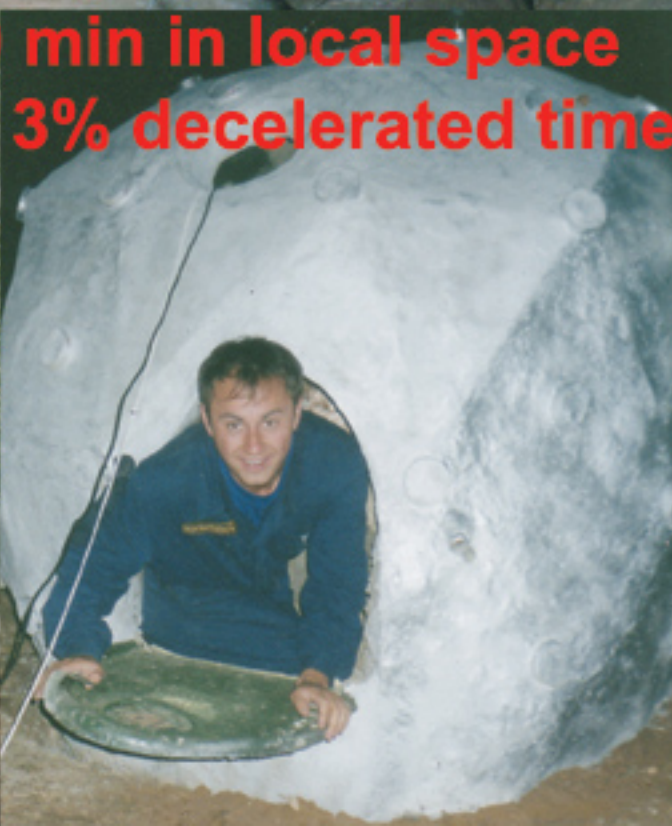


# New Energy Technologies

Research on advanced propulsion systems and new energy sources  
Published by Faraday Lab Ltd #3 November -December 2001

## Time Machine

First experiment with people!  
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of 3% decelerated time!



Head of research group  
KOSMOPOISK  
Dr. Vadim A. Chernobrov



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# *Electrical hydrogen generator 150 KWt output power !*



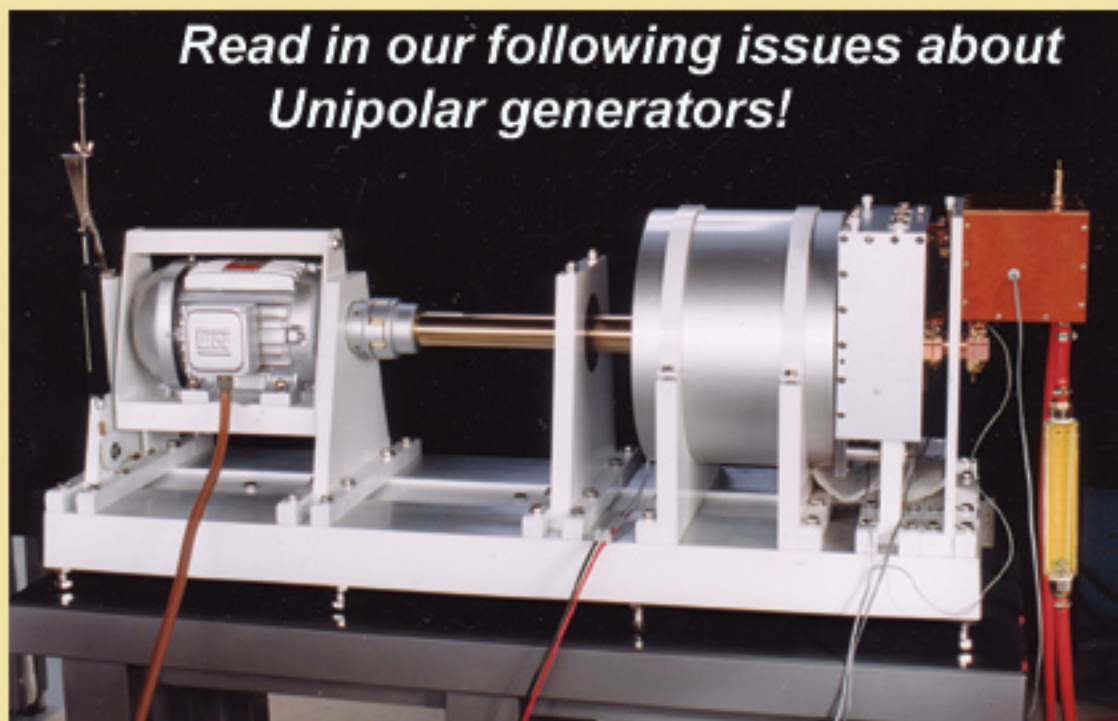
*Electrical hydrogen generator is realized by V.Studennikov and G.Kudymov as a prototype of 150 KWt heat power. Authors create an artificial gravitational field by means of rotation. With this they produce cheap hydrogen. Read more in this issue.*

*The excessive power, which is produced by this generator is compensated by environmental heat!*

## *New energy research in New Zealand*



*Dr. Ashley Gray*

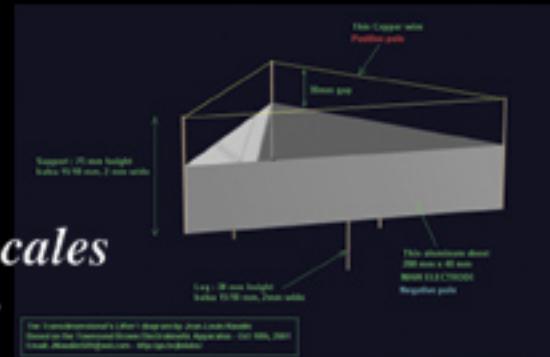


*Read in our following issues about  
Unipolar generators!*



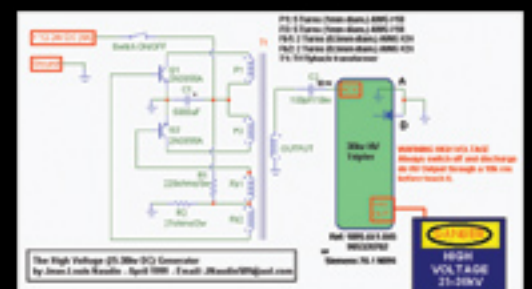
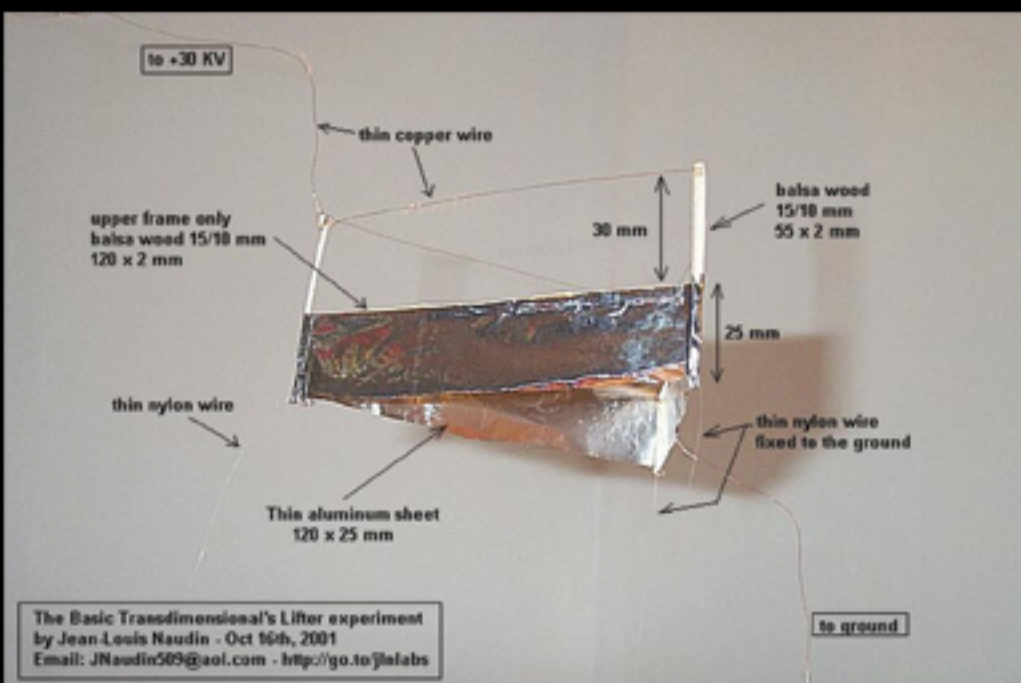
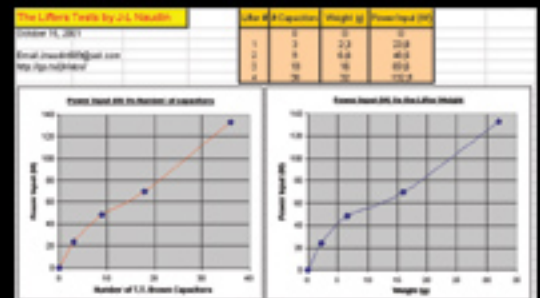
# Electrokinetic experiments

*Simplest asymmetrical capacitor by Jean-Louis Naudin, France named as "Frolov's Hat" was tested on the scales in 1999. The name is related with Alexander Frolov's experiments on this topic.*



*US Patent N 2,949,550 Aug. 16, 1960 and N 3,187,206 June 1, 1965, author T.T.Brown.*

*Now Naudin's "triangle lifter" version can fly and the next step is to create an onboard high voltage power supply for demonstration of autonomous flight.*



### NEW ENERGY TECHNOLOGIES #3

1. Time is a Mystery of the Universe, **Dr. Lavrenty S. Shikhobalov**, St.Petersburg, Russia
2. Experiments with a man in the Time Machine. **Dr. Vadim Chernobrov**, Moscow, Russia
3. Time is a physical substance, **Dr. Kirill P. Butusov**, St.Petersburg, Russia
4. Experimenting with time, **Prof. Velimir Abramovich**, "Time Institute", Rotterdam, Holland
5. Practical application of time rate control (TRC) theory. **Alexander V. Frolov**, Russia
6. Irving Langmuir and atomic hydrogen. **Dr. Nicholas Moller**, Greece
7. Hydrogen energy. **Studennikov V.V., Kudymov G.I.**, Russia
8. About strange effects related to rotating magnetic systems. **M. Pitkanen**, Finland
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14. Propulsion from relativity effect of inertial force. **Takuya Ishizaka**, Japan
15. Physical properties of axion fields. Influence of axion field on hardness of pearlitic cast iron. **Alexander Shpilman**, Kazakhstan.
16. On the significance of conical shape of rotor in Clem's generator. **Alexander V. Frolov**, Russia
17. On history of cold nuclear fusion in Russia of 1960s. Review **Alexander V. Frolov**, Russia

At the present moment in aerospace it's technically possible to realize only the jet propulsion or use the inertial forces (for an example Tolchins' or Savelkaevs' inertial machines). But they are non-efficient and slow methods. (We'll pay no attention to exotic methods of propulsion: the space sail-ship based on the Sun-wind etc., because they are not promising enough.) The jet propulsion unit or inertial machines need on-board energy source, which is limited. That is a problem for aerospace systems.

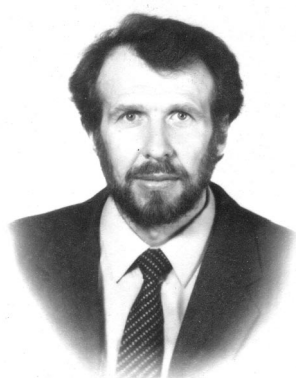
The first simple and rough illustration of the new principle of motion is a small experiment. Let's take a piece of soap and press it in the palms strongly. Incidentally, if the pressure of the palms is even, the soap will be left in the state of immobility. If the pressure

is not even the soap will slip out of hands with a high speed. It is most important to understand that the soap will not spend any energy. We can press and press it as long as we wish, and the soap will keep slipping out.

The aerodynamic (hydrodynamic) force is the analogous example. It's a **reaction of environment (the space) on the shape** of a moving wing. The appearance of a rarefaction above the wing creates the lifting capacity. It should be noted that environment creates the force itself and the wing doesn't expend any energy except for the translation motion.

The third example is an appearance of the buoyancy in water. It's also a **reaction of environment (the space)** that depends **on the density of an object's matter**.

## Time is a Mystery of the Universe



Dr. Lavrenty S. Shikhobalov

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Milleniums pass, but we still do not know, what is time. We hardly have another such notion, which has so different and even alternative conceptions. Here are some widespread conceptions of time:

- *There is no time; it is a subjective sensation.*
- *Time is an objective reality, which is a form of matter existence as space.*
- *Time is only a comfortable method to describe the motion of bodies and processes, which take place in the World.*
- *Time is a cause of motion of bodies and passing processes.*
- *Time is absolute, it does not depend on anything and it is similar for all systems.*
- *Time is relative, it is own for every system.*
- *Time is a measure of strictly periodic (cyclic) processes, which are realized in stationary systems only.*
- *Time is a measure of changeability of systems; time does not pass in stationary systems.*

- *Time is reversible (because basic equations in physics do not change with change of sign of time).*
- *Time is essentially irreversible (because all human experience is an evidence that the future differs from the past, and that a movie, which was started counter, is not realistic).*
- *Time can be described mathematically as a scalar variable quantity, which changes equally in all points of three-dimensional physical space.*
- *Time can be described as one of directions in four-dimensional variety, which is called space-time, at that this direction, generally speaking, is own for every physical system.*

In general, the situation about the problem of time now is similar to the situation some centuries ago. It is well illustrated by the words, which are attributed to Augustine Blessed. They sound like this: "While I do not think about time, I know that time exists, but when I begin to think about it, I stop understanding, what it is." Situation related with the notion of time is complicated by the circumstance that this notion is widely used by representatives of various fields of knowledge (biologists, geologists, historians, philologists, and psychologists). With this many authors put their own sense in the notion of time. Often they do not want to take the trouble of explanation, what do they understand under the term of "time".

Let's consider some basic theses concerning time, which were based on achievements of philosophy and physics, sciences, where problem of time is investigated most deeply and in full. The most of known conceptions of time can be kept within two principally different conceptions of time, those are relational and substantial. These conceptions differ in interpretation of relation of time and physical matter (substance and physical fields belong to physical matter). According to relational conception there are no time itself in nature, and time is only a relation or system of relations between physical events. In other words, time is a specific manifestation

of properties of physical bodies and changes occurring to them.

Another conception, substantial one, vice versa supposes that time represents an independent phenomenon of nature; it is a substance of a special kind, which exists along with space, substance and physical fields. Relational conception of time is usually associated with the names of Aristotle, G.V. Leibnitz, A. Einstein. The brightest spokesmen of substantial conception of time are Democritus, I. Newton and one of the modern scientists N.A. Kozyrev.

From the philosophical position both conceptions of time are analyzed in the monograph [1] in details. It is shown in this monograph that each concept has its own merits and demerits, but with the modern extent of their development not one of them describes all properties of time. In relation with this fact we made a conclusion, that not one of these conceptions has advantages to each other (though we can mention that substantial conception is more adequate to the materialistic ideology). The analysis of relational and substantial concepts is made in the article [2] from positions of physics. A conclusion that modern physics including theory of relativity also does not give a ground to prefer one of these conceptions is made in this article. Besides, a wide range of fundamental questions connected with time has no answer. That's why both conceptions of time need further development.

Let's note the difficulties on the way of development of these conceptions. A complexity of generation of physical theory of time on the basis of relational conception lies in the following. Since relational conception assumes that time is fully determined by physical matter, then time in the frames of such theory should be expressed in some characteristics of processes, which take part in physical systems. But then the notion of process itself should be defined before introduction of notion of time and independently on it.

However, we hardly can imagine, how we can formulate a definition of process without paying attention on the notion of time, in particular, without using such characteristics of process as its duration or speed of its passing. Let's note that analogous situation could appear during the development of relational conception of space. Here we need to formulate a definition of physical system before introduction of notion of space, i.e. without mentioning even of such simplest characteristic of system as its spatial size. It is not clear how we can do it.

An essential difficulty during the construction of physical theory of time on the basis of substantial conception lies in the need to answer the question: "How does time substance transfer its properties to physical matter?"

The author of this article does not know the works, in which we can find a fact of successful overcoming of the above mentioned difficulty being on the way of

development of relational conception of time. Researchers holding this conception usually concentrate their attention on description of methods to measure time and do not clear up the essence of time phenomenon itself in details. Let's remind that the term "time" has two different senses. On the one hand it means a certain phenomenon of nature (time-phenomenon). And on the other hand it means a quantitative characteristic of this phenomenon (time-parameter). Since the clocks as any physical device is an element of physical matter, then it seems to be natural that we can generate a theory, in which the readings of clocks giving the values of time-parameter are expressed by some properties of physical matter. However, even the successfully construction of such a theory (which can be called the relational theory of clocks or relational theory of time-parameter) does not mean a binding correctness of relational conception of time, since this theory does not tell anything about the essence of time-phenomenon. Let's underline in repetition of [3] that a skill to measure some value is not a guarantee of understanding of nature of physical phenomenon described by it.

The most obvious case to illustrate it is the case with the phenomenon of heat. The temperature of bodies was measured by means of thermometer as in the times when existence of hydrogen was recognized or after the creation of molecular-kinetic theory of substance. Thus, we can state that there is no real progress in development of physical theory of time on the basis of relational concept yet.

As opposed to this theory a certain development took shape in substantial conception of time. First of all it is related with the name of Saint Petersburg physicist Nikolay A. Kozyrev (1908-1983). Working on the problem of the source of stellar energy, N.A. Kozyrev advanced a hypothesis on presence of other properties of time along with duration. These are the properties, which give time a possibility to influence events in the World. The scientist called these properties physical or active, and the theory to describe them he called "causal mechanics" (such name was stipulated by the fact that according to scientist's ideas physical properties of time manifest in cause-effect relations). N.A. Kozyrev made a huge theoretical and experimental work in development of his hypothesis and expanded it with a cycle of astronomical observations. Main results of these researches are stated in score of his publications. Most of them were included in the collection of scientist's selected works [4]. Unfortunately, N.A. Kozyrev didn't have time to finish the development of his theory. The scientist showed a possible way to study time and passed a significant part of this way himself.

Followers of the scientist make the further advance on the way outlined by N.A. Kozyrev. In particular, in the work [5] a notion of spatial-time substance is introduced to the development of Kozyrev's ideas. The latter represents a four-dimensional variety, which has geometry of pseudoeuclidian space by Minkovsky (due to this fact it matches all theses of the theory of

relativity). Besides, substance has certain physical properties. It is supposed in the given model that substance and fields, which form our world, are not independent physical realities, but specific structures of such substance (like concentrations, vortexes, etc.) and as a whole our World is a single wave like solitary wave, which propagates through substance in the direction from the past to the future. In frames of the given model we can immediately solve the question formulated above: how the time substance transfers its properties to the physical matter? Since substance and fields are particular states of substance itself, then there is no requirement of special transfer of properties from substance to matter and fields. These objects initially have properties, which are common with substance. In such model the notions of the course of time and its direction get a clear sense, it is easy to prove the statement on symmetry of the World, which is analogous to the known CPT-theorem of quantum theory of field. We have a possibility to show that mirror asymmetry of the World and asymmetry of it regarding particles and antiparticles can be the consequences of spatial-time substance acting upon the World. Development of the given notions was a construction of a model of electron as a structure formed by such substance [6,7]. This model describes the electromagnetic field of arbitrarily moving charge in details (without an application of Maxwell's equations).

Up to the present time many results of theoretical, laboratory and astronomical researches by N.A. Kozyrev found a confirmation and development in the works by other specialists, which used different approaches. Some of these works were published in the collective monograph [8] and in two special issues of "Galilean Electrodynamics" journal [9]. The work of Russian interdisciplinary seminar on temporology permanently acting on the base of Moscow State University (head of this seminar is A.P. Levitch) is devoted to the studying of time phenomenon. Materials of the seminar are placed at: [www.chronos.msu.ru/SEMINAR/rindex.htm](http://www.chronos.msu.ru/SEMINAR/rindex.htm).

A flow of information on researches, which work out Kozyrev's ideas has been growing during last years; and it is the evidence that this direction of studying of time founded by this outstanding scientist has perspectives. At the same time we should recognize that many problems concerning time are not solved yet, and time remains the mystery of the Universe.

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## N. A. Kozyrev's Ideas Today

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(Editor's notes by Alexander V. Frolov)

### Introduction

Nikolay Alexandrovich Kozyrev's ideas amaze our imagination. They are full of optimism. For the first time in physical constructions we can see vital, creative principles of the World, which are able to oppose to its heat death foretold by traditional physics to be inevitable.

N.A. Kozyrev came to his ideas by the analysis of the observed data about luminance, masses and sizes of

stars. This analysis brought him to a conclusion that the processes of thermonuclear synthesis cannot serve as a main source of stellar energy. **The scientist made a hypothesis that Time is a source of stellar energy.** According to N.A. Kozyrev, Time has active (physical) properties besides its passive property of duration. Time effect the events in the World due to these active properties. These properties manifest in cause-effect relations and express themselves in the counteraction to the usual course of processes, which lead to the destruction of systems organization. Time influence is very small in comparison with usual destructive course of processes, however it is dispersed everywhere in Nature, therefore **there is a possibility of its accumulation.** Such possibility is provided in living organisms and massive cosmic bodies, in stars at first. **Active properties of Time can provide the interrelation of objects, when there are no usual physical effects between them. Time joins the entire**



# Experiments With a Man in the Time Machine

## Flights of the first temporonauts (time astronauts)

Dr. Vadim A. Chernobrov

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*In 14 years our Research association "Kosmopoisk" could build 4 laboratory systems of small size and small power to test the possibility of time course control (other two systems are under construction now). These systems allow changing the speed of physical Time (these systems are usually called the prototypes of the Time Machine, TM). Some experiments on acceleration and deceleration of Time were made. Besides the devices, we used insects and mice as laboratory animals. It took us a long time to make the experiments of a great scale (experiments with a man, in particular). The idea to build a system seemed to be very difficult. And it was very expensive to build it without State financing or any sponsor.*

*We had not got any of it yet, but there is always a way out.*

### Construction of "LOVONDATR-7"

*Editor's: the name LOVONDATR in Russian means a trap for musk-rat. This name historically belongs to all Chernobrov's designs, because the creation of the first TM was masked as a research project on creation of electromagnetic trap for musk-rats.*

In summer 2001, after several years of preparation work, "Kosmopoisk" began the assembling of the biggest system of this type. The works lasted about 3 months; about one hundred people took part in the construction and assembling of the Time Machine system. There were: a sphere of 30 cm with a double electromagnetic work surface (EWS) inside of the sphere of 1 meter with a double EWS, which was placed inside of another sphere of 2,1 meters with a triple EWS. Each EWS is a system of solenoids emitters, which create the convergent electromagnetic wave. *Editor's: see details about the convergent electromagnetic waves in the previous article of the autor.*

The entire triple construction (like Russian doll Matroyshka) was supposed to use for the experiments with mice. For the experiments with a man we took out the inner EWS and the medium EWS worked as a module of useful load (UL). The medium and external spheres have the doors for access of a man and load. Also they have a simple system of life support (in particular, there are systems of passive and active conditioning and removal of the condensate).

## Experiments with animals

During the testing of a new experimental system of TM we supposed the following succession: mice were the first to take part in experiments, then cats, and a man should follow them. A special delivery of 21 mice and then 10 laboratory mice from Moscow took place. During the experiments with mice, due to the anomalous zone influence and high temperature, most of mice (25 among 31) died. But after that other mice survived during the 2-hour experimentance, we decided to begin the next stage.

The volunteer was chosen in a month before the experiments. Purebred cats are not good for the experiments due to their susceptibility, or their loving owners were afraid to make them the victims. The cat that we needed came himself. One of the members of "Kosmopoisk" experiments Maria Lorenz was buying an ice cream, when an exhausted cat came from the nearest gateway for mendicancy. The future test animal was immediately called Plombir (sort of ice-cream) and brought to the research center. A month passed, and Plombir got his fit while eating the canned fish, caught all the mice in the surroundings and achieved the standard weight corresponding to his age. This old stager seemed to be the ideal candidate for our difficult experiments, which could have unpredictable results. But the cat was too experienced. When we turned on the system in a distance of 200 meters from the cat, he somehow felt its weak field (possibly, cats exactly felt this field, because the system worked absolutely quietly). The cat had a foreboding in our intentions and scratched Masha, his "foster mother" (it was the first incident with this very kind cat). Then the cat quickly disappeared in the forest. In the evening, when we turned out the system, the cat came back. In the following days the cat also run at the first seconds of the experiments and appeared immediately after the last seconds.

It was the very reason to take the dog as a first experimental animal. Just in few days before the first experiment the other volunteer appeared in the center. It was a black male dog of unknown breed with a white breast. We still do not know from what place in this wild forest he appeared. Due to his strange appearance (immediately after the decline of the young Moon) the dog got the name Lunokhod (Moon-buggy). This Lunokhod was put inside the system. During the boarding he was trembling with fear and he was not quite calm during the experiment. He had not patience for the planned 2 hours in the cabin, and he released himself and left the system at the 108 minute of the experiment.

Not taking into account the nervous stress, we didn't found any deviations in the health of the dog as well as in the health of the last group of laboratory mice. At 7 p.m. on August 26, 2001, after the final medical examination of the sleeping dog Lunokhod, we decided to start the experiments with a man.

## Experiments with a man

Selection of the first candidates to the experimental group was made beforehand from several tens of volunteers. We didn't know exactly the extent of physical and psychological stress, which will influence the man during the travel in Time. That's why we had the extended requirements to the candidates. Though, after some articles and books about these experiments were published, our research center "Kosmopoisk" got several tens of letters with a request to take part in experiments and even to "travel to the Past to make some corrections there", we decided not to work with the volunteers, which have no training. Only members of "Kosmopoisk" took part in this selection. These members were tested in the real expeditions with very extreme conditions.

***The first man to take part in the experiment was Ivan Konov. Possibly this name will go down in history as a name of the first temporonaut. It will depend on the fact, how this series of experiments will be historically evaluated by other scientists, but now we can be absolutely sure that it was the first attempt to travel the man in Time by means of the technical device, and it is a real fact.***

The first flight of a man in Time took place from 7.30 p.m. till 8.00 p.m. (August 26, 2001). Deceleration of the physical Time was registered during the half an hour of reference Time. The maximal decrease in the speed of Time constituted 3% regarding to the speed of reference Earth Time. Dr. V. Chernobrov, Head of the experiments, made measurements and control of TM from the outside.

Since after the Konov's flight, in this day and the next days some more people took part in the experiments on deceleration of Time inside the TM. They were: Dr. V. Chernobrov, V. Fokeev, A. Gavritchenko, D. Kurkov, M. Lorenz, L. Kuleshova, E. Golovina and others.

What did people feel during the travel in Time? Of course, this question was the most interesting. There were no experiments with measurement equipment or animals inside the TM, which could give the answer. Only one man among 9 people felt nothing. 5 men among 6 felt that their pulse became a little more rapid, easy giddiness, a little itch on the skin and other slight feelings. All 3 women felt a lot more range of emotions. They were: appearance of the "starry sky", "luminous vortex", "color spots" in their field of vision, twist of their body, astral leaving their body, "freezing of extremities", etc.

There were no unusual feelings among the people, who were outside of the system, except headache. **We should only say in addition, that we got the most surprising feelings before it was turned on, but not after it.** Here is a small list of observations: a significant amount of ozone in the air (it was felt in several hundreds meters from the TM), sudden appearance and the similar disappearance of radiation (it was registered

by devices), strange lighting effects (including the repeated lighting effects in the sky above the system), some strange sounds heard from the inside and other objective and subjective feelings. We should underline that these feelings were observed before the first starting, i.e. in the moment, when there were nothing inside the TM to create the strange smells, especially radiation.

## Conclusions from the experiments

When the experiments are not finished, certainly we can call them the preliminary conclusions. So, it was stated during the experiments, that the processes of acceleration and deceleration of Time are distinctly different in their characteristics and consequences. Thus, the deceleration occurred much more fluently and steadily. During the acceleration sharp jumps in indications were observed. The general instability and dependence from the external factors characterized the behavior of this mode of the TM. In particular, the instability of acceleration lies in the fact that with a fixed power the effect of Time course deviation depended on the daytime and the Moon phase. Possibly, it depended on the other reasons including the presence of operator near the TM. Even the small external influence (for example, mechanical vibration) led to the significant change in the effect.

In spite of the small changes of Time, even the so small acceleration can be called the likeness of "travel to the Future". But deceleration is smaller than 1 hour per hour cannot be considered as a "travel to the Past". So, physics of the Future Time is radically different from physics of the Past Time.

Present Time is the transition or conversion of a multi-alternative Future Time in the unchangeable Past Time. So, flight to the Past Time (at the "negative density  $t/t_E$ ") and flight to the Future Time should be different. It can be compared with moves of an ant along a tree: from any point of a tree (from the Present Time) there is only one way down (to the Past Time) and there are several ways upwards (in the Future Time). However, for different possible ways to the Future there are doubtless and most probable variants, also there are impossible and almost possible variants. The movement to the Future will be especially unstable and power-intensive if the variant of Future is close to the impossible version. According to the suggested "law of the top of a tree", the return move is possible only if the traveler in Time does not interfere with occurring events and his way to the Past remained unchanged, otherwise the traveler will return to another parallel Present Time of History on another branch of the tree. The penetration into the Future from the Present is hindered by the choice of a branch, but the return move from any variant of the Future Time to the Present Time is possible regardless as to the behavior of the traveler.

Experiments proved that the Person and Time have a very strong influence on each other. The effect of the operator on experiment is detected, but it has not been



investigated completely yet. It was found also that harmful effect on biological systems is not related to the process of movement in Time itself but is a result of the difference of the Time rate value in various parts of a body (a biological system).

Inside of the laboratory setup it was also discovered that Time could be changed with some inertia. Areas of space having different Time rates have vague borders. With sufficient difference in Time rate the human can see an area with a different Time rate as some white mist. Higher the difference – the mist is denser, that can be used as an alarm signal for biological systems. It is possible to consider Time-travel as possible and (after experiments with mice) there are reasons to suppose it will be safe for travelers if they follow certain rules. It is especially necessary to emphasize: the trips through Time (due to new discovered properties of Time) can't affect the Past and they can't change our past history. All the so-called paradoxes for the traveler in Time (for example when "he meets himself in the Past" or "he kills his grandfather in his childhood" have clear solutions in 3-dimensional Time.

It is possible to consider as a proven fact that Time has more than one dimension, i.e. O. Bartini's theoretical calculations are confirmed by these experiments: Time has 3 dimensions. Hence our Earth world can be considered as a 6-dimensional object: length, width, height, age or date of Time, variant of a History or erosion of Time, density or rate of Time. The concept of "the Arrow of Time" as fourth dimension (moment of Time) is a particular case of the concept of sixth dimension (rate of Time) that leads to the physical concepts of gravitation and energy and they are simultaneously connected. Concepts of the "Einstein-Rosen bridges" known since 1916 or "worm-holes"



introduced into science by John Willer in the 50's, are travels in 5<sup>th</sup> and 6<sup>th</sup> dimensions, i.e. the "classical" Time travels, which were described by H. Wells.

*Editor's: As the reader could note, the author does not disclosure the secrets of the TM design. From the photo you can see the electromagnets, which form the regular stereometrical construction as well as the cables from the TM to the control unit. Dr. Chernobrov mentioned the converging electromagnetic waves only. So, to understand how it works, it is necessary to get a clear notion of the converging electromagnetic waves. Let's imagine the ripple effect created by a stone in the water. The waves move from a central point to periphery. The converging waves are just an opposite process: the waves move from periphery to the central point. Is it possible in Nature? Yes, sure. Dr. Chernobrov wrote: "Let's throw a hoop on the water and inside of the hoop we'll see converging waves." The Time Machine technology by Dr. Chernobrov is based on the similar principle.*

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## Time Machine Project

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Faraday Labs Ltd and Dr. Vadim Chernobrov have signed the agreement on scientific-research work on investigation of active properties of time.

In the course of the previous experimental works, carried out by Dr. Chernobrov's research team during the period from 1984-2002, four versions of Time Machine had been made and tested. At these devices (the biggest system is about 1 meter in diameter) the effects of deceleration and acceleration of time course were created and measured. The principles of control of time course velocity were based on the



**Alexander V. Frolov, General Director Faraday Labs Ltd and Ph. Dr. Vadim A. Chernobrov have just signed the Contract**

interconnection of electromagnetic processes and physical properties of space-time. Special electromagnets, operating in pulse mode, are placed at the spherical frame. They create the so-called "converging wave", which by Alexander Frolov is a longitudinal wave in nature.

A joint solution of equations (IX) and (XII) gives us, as it is well known, a transverse wave with the density of energy flow equal to:

$$\vec{P}_{\perp} = [\vec{E} \times \vec{H}] ;$$

A joint solution of equations (X) and (XI) gives a longitudinal wave with the density of energy flow equal to:

$$\vec{P}_{\parallel} = \frac{1}{2} [c^2 \rho \cdot \vec{A} + \varphi \cdot \vec{j}] ;$$

As distinct from the emitters of transverse waves (dipoles of the cylindrical symmetry) the emitters of longitudinal waves should have spherical symmetry, i.e. to be the monopoles.

During the analysis of the known physical fields we can see that most of them show themselves in a small volume near the sources, i.e. nuclear field, field of weak interaction, electrostatic field (which is compensated by the fields of charges of other sign) and magnetostatic field, though the latter can spread for the distances similar to the size of Galaxy. However, electromagnetic

waves and gravitational field are really long-distance fields. At the same time both fields decrease according to the analogous law: inversely to the square of distance.

All this gives us a thought that the gravitational field can be undulatory just as the electromagnetic field. But unlike the latter it is some other class of waves, i.e. longitudinal, but not transverse. The penetrability of these waves should be very high. Admittedly, telecommunication by these waves can be made through the entire globe.

We can suppose that typically wave phenomena should be observed in gravitational field, i.e. diffraction and interference.

Material on this question was stated by the author in detail in 1991 in the article "Symmetrization of the Maxwell-Lorentz equations" in collected articles "Problems of space and time in modern natural science", part 15, Academy of Science, Russian Federation, Leningrad, 1991.

Table 1

		Statics in time		Dynamics in time			
Intensity of fields		$\vec{E} = \vec{V} \times \vec{B} \quad (\text{I})$	$\nabla \times \vec{E} = 0 \quad (\text{V})$	$\nabla \times \vec{E} = -\frac{\partial \vec{B}}{\partial t} \quad (\text{IX})$		Scalar products	Vectorial products
	Sources of fields		$\nabla \cdot \vec{D} = \rho \quad (\text{VI})$				
		$\rho = -\frac{1}{c^2} \vec{V} \cdot \vec{j} \quad (\text{II})$		$? \quad (\text{X})$			
			Equations of connection				
		$\vec{J} = -\vec{V} \cdot \rho \quad (\text{III})$		$\nabla \cdot \vec{j} = -\frac{\partial \rho}{\partial t} \quad (\text{XI})$			
			$\nabla \cdot \vec{B} = 0 \quad (\text{VII})$				
		$\vec{H} = -\vec{V} \times \vec{D} \quad (\text{IV})$	$\nabla \times \vec{H} = \vec{j} \quad (\text{VIII})$	$\nabla \times \vec{H} = \frac{\partial \vec{D}}{\partial t} \quad (\text{XII})$			
		Dynamics in space	Statics in space				

## Time is a Physical Substance

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One hundred years ago in 1889 Russian physicist I.O. Yarkovsky suggested a thought [7] that attraction of bodies to the Earth is stipulated by inflow of ether in it, which is partially transformed into substance in bowels of the Earth. This thought showed a possible way to overcome the problem of warming-up of the Earth by particles falling on it. J. Maxwell wrote about it when he considered the hypothesis by Lesaje, which explained the gravitational interaction by the pressure of flow of "extraworld corpuscles".

An important consequence about the continuous growth of the Earth's mass followed from the hypothesis by I.O. Yarkovsky that found its confirmation in further development of Earth science.

It was showed in works by I.V. Kirillov [2-4] that 250-350 millions years ago all continents closed up without any space on the surface of the globe of two time smaller diameter. There is also a consequence from his works that gravity in this epoch was two time lower than today.

L.S. Smirnov and Ju.N. Lubina [6] paid their attention to the fact that in ancient sediments natural angles of slope of sands in aqueous medium greatly exceed modern ones. They worked several thousands of their measurements and data from literature and found that



gravity on the surface of the Earth grew in several times during last 1,5 billion years.

Taking into account the simultaneous two time growth of gravity and radius of the Earth we naturally come to a conclusion that mass of the Earth grew in 8 times during 250-350 millions years. A hypothesis by P. Dirac that the cause of swelling of the Earth is a decrease of value of gravitational constant should be rejected since it is not true.

Let's show that average density of the Earth during the period of 250-300 millions years practically didn't change. Acceleration of free fall on the surface of the Earth can be found by the formula:

$$g = \frac{\gamma M}{R^2} = \frac{\gamma}{R^2} \cdot \frac{4}{3} \pi \rho R^3 = \frac{4}{3} \pi \rho \gamma R \quad (1)$$

where  $g$  is an acceleration of free fall,  
 $\gamma$  is a gravitation constant,  
 $M, \rho, R$  are the mass, density and radius of the Earth.

Let's find the density of the Earth from this formula:

$$\rho = \frac{3g}{4\pi\gamma R}; \quad (2)$$

From this formula we can see that simultaneous growth of acceleration of free fall and radius of the Earth in two times, taken place in the period of 250-300 years don't affect the value of its density.

Let's consider possible parameters, which define the growth of mass of the Earth, on the assumption of the hypothesis by I.O. Yarkovsky. Let's regard that the density of energy flow, which flows into nuclei of atoms from outside, is defined by the density of energy of gravitational field on the surface of nuclei, and let's take the speed of movement of the flow equal to the speed of light:

$$\omega = \frac{G^2}{8\pi}; \quad (3)$$

where  $G$  is the tension of gravitational field, which in its turn is equal to:

$$G_n = \frac{\sqrt{\gamma m_n}}{R_n^2}; \quad (4)$$

where  $m_n$  and  $R_n$  are the mass and radius of nucleus. It follows that the density of gravitational energy will be equal to:

$$\omega = \frac{\gamma m_n^2}{8\pi R_n^4}; \quad (5)$$

The value of the flow of gravitational energy, which flows into the nucleus, will be equal to:

$$\Delta W = \omega \cdot 4\pi R_n^2 \cdot c \cdot \Delta t; \quad (6)$$

where  $c$  is the speed of the flow,  $\Delta t$  is the time of its inflow. Taking into account the ratio of mass and energy:

$$mc^2 = W, \quad (7)$$

let's find the increment of the mass of nucleus during the time  $\Delta t$  taking into account the formula (5):

$$\Delta m_n = \frac{\Delta W}{c^2} = \frac{\omega}{c} \cdot 4\pi R_n^2 \cdot \Delta t = \frac{\gamma \cdot m_n^2 \cdot \Delta t}{2 \cdot R_n^2 \cdot c}; \quad (8)$$

Since densities of nuclei can be considered to be equal to each other, then:

$$R_n = R_N \cdot A^{1/3}; \quad (9)$$

where atomic weight is defined by the ratio between the mass of nucleus and nucleon:

$$A = \frac{m_n}{m_N}; \quad (10)$$

From formulas (8), (9) and (10) we will get:

$$\frac{\Delta m_n}{m_n} = \frac{\gamma \cdot m_N \cdot A^{1/3} \cdot \Delta t}{2 \cdot R_N^2 \cdot c}; \quad (11)$$

Changing the increments on differentials we will get:

$$\frac{dm_n}{m_n} = \delta_A \cdot dt; \quad (12)$$

$$\text{where } \delta_A = \delta_N \cdot A^{1/3}; \text{ and } \delta_N = \frac{\gamma \cdot m_N}{2 \cdot R_N^2 \cdot c}; \quad (13)$$

in which connection the value  $\delta_N \sim m^{1/3}$ , i.e. it changes very slowly. That's why to be simple we will consider it as a constant in the first approximation. Let's find the value  $\delta_N$ :

$$\delta_N = \frac{6,67 \cdot 10^{-8} \cdot 1,6735 \cdot 10^{-24}}{2 \cdot (1,56 \cdot 10^{-13})^2 \cdot 3 \cdot 10^{10}} = 0,76445 \cdot 10^{-16} \text{ sec}^{-1};$$

Considering that the relative increase of the mass of the Earth is equal to the same increase for nuclei of atoms

$$\frac{dM}{M} = \delta_A \cdot dt \quad (14)$$

and solving this equation we will get:

$$M = M_0 \cdot \exp(\delta_A \cdot t); \quad (15)$$

Let's find the period of doubling of the Earth's mass:

$$2M_0 = M_0 \cdot \exp(\delta_A \cdot \tau_A); \quad \ln 2 = \delta_A \cdot \tau_A;$$

$$\tau_A = \frac{\ln 2}{\delta_A} = A^{-1/3} \cdot \frac{\ln 2}{\delta_N}.$$

Thus:  $\tau_A = \tau_N \cdot A^{-1/3}. \quad (16)$

where  $\tau_N = \frac{\ln^2}{\delta_N} \quad (17)$

is a period of doubling of mass of nucleon numerically equal to:

$$\tau = \frac{0,69315}{0,76445} \cdot 10^{16} = 0,9067 \cdot 10^{16} \text{ sec} = 287,33 \text{ mln. years}$$

Let's calculate the average value  $\delta_{av}$  taking into account the elementary structure of Earth's substance on the basis of Brown's and Masset's data [1]. (See table 1).

Table 1

#	Element	n%	A	A <sup>1/3</sup>	A <sup>1/3</sup> (n%)/92
1	Oxygen	32.0	16	2.5198	0.87645
2	Iron	25.0	56	3.8258	1.03963
3	Silicon	14.5	28	3.0366	0.47858
4	Magnesium	12.5	24	2.8845	0.39191
5	Sulfur	8.0	32	3.1748	0.27608
	TOTAL:	92.0	-	-	3.06274

It follows from the table that  $A_{av} = (3.06274)^3 \approx 28.73$ ; from this

$$\delta_{av} = \delta_N \cdot A_{av}^{1/3} = 0,76445 \cdot 10^{-16} \cdot 3,06274 = 2,3368 \cdot 10^{-16} \text{ sec}^{-1},$$

as well as

$$\tau_{av} = \tau_N \cdot A^{-1/3} = \frac{287,33}{3,06274} = 93,8 \text{ mln. years.}$$

$$m_e = m_{e0} \cdot \exp(\delta_e \cdot t); \quad (18)$$

with this, if  $m_e$  is the mass of an electron in the given moment of time, then  $m_{e0}$  is the mass of an electron in the moment of time, which is distant back on the value  $t$ . therefore,

$$m_{e0} = m_e \cdot \exp(-\delta_e \cdot t); \quad (19)$$

On the assumption of that mass of the Earth increased in  $\delta = 2^3$  times, let's find the time of its increase:  $T = 3t_{av} = 93,8 \times 3 = 281,4$  mln years. The received figure keeps with the interval of 250-300 mln. years given in the works by Kirillov. Let's calculate the value  $\delta_e$  for an electron with a supposition that its density is equal to the density of nucleon:

$$\delta_e = \delta_N \left( \frac{m_e}{m_N} \right)^{1/3} = 0,76445 \cdot 10^{-16} (1837,4)^{-1/3} = 6,24 \cdot 10^{-18} \text{ sec}^{-1}.$$

$$\tau_e = \frac{\ln 2}{\delta_e} = 3,52 \text{ billion years}$$

accordingly.

Let's suppose, that the mass of an electron also increases by exponential law:

Then the energy of photon emitted by atom of hydrogen will depend on time in the following way:

$$E_{ph} = h_1 \cdot \omega = \frac{e^4 m_{e0}}{2h_1^2} \left( \frac{1}{n^2} - \frac{1}{k^2} \right) \quad (20)$$

where  $h_1 = \frac{h}{2\pi}$  is a reduced Plank's constant,  $\omega$  is a cyclic frequency,  $e$  is a charge of an electron,  $n$ ,  $k$  are the main quantum numbers. From this the relative change of frequency will be equal to:

$$\frac{d\omega}{\omega} = \frac{dm_{e0}}{m_{e0}} = -\delta_e \cdot dt; \quad (21)$$

The passage time of the way  $dl$  by photon is equal to:

$$dt = \frac{dl}{c}; \quad (22)$$



From this:

$$\frac{d\omega}{\omega} = -\delta_e \cdot \frac{dl}{c}; \quad (23)$$

So, atom of hydrogen will emit two different photons in the interval of time of  $dt$ . These photons are different from each other by their frequency at the value of

$$d\omega = \omega \cdot \delta_e \cdot dt;$$

If we compare the photon, which came from the source situated on a distance of  $dl$  from us, with a laboratory photon, then the relative change of its frequency will be equal to:

$$\frac{d\omega}{\omega} = -\delta_e \cdot \frac{dl}{c}; \quad (24)$$

i.e. the farther the source of radiation is situated from us, the more its spectrum will be shifted in the direction of lower frequencies. E. Hubble discovered this phenomenon known as a «red shift» in 1929 and it is described by the formula:

$$\frac{d\lambda}{\lambda} = -\frac{d\omega}{\omega} = H \cdot \frac{dl}{c}; \quad (25)$$

where  $l$  is the wavelength,  
 $dl$  is a distance to the object of observation,  
 $H$  is Hubble's constant.

Now there is a following accepted value of Hubble's constant:

$$H = 75 \frac{km}{c \cdot MPC} = \frac{75 \cdot 10^3}{3,086 \cdot 10^{22}} = 2,4303 \cdot 10^{-18} \text{ sec}^{-1},$$

where 1 MPC is 1 megaparsec equal to  $3,086 \cdot 10^{22} \text{ m}$ .

However, the value of the constant found by Hubble himself was equal to 530 (km/sec MPC), then in 1952 Baade gave a value equal to 290 (km/sec MPC); later a value of 180 (km/sec MPC) was received, and at last the value, which is accepted now, is given in the limits of 50-100 (km/sec MPC). The value of Hubble's constant calculated by the formula (24) has a value of:

$$H = \delta_e = 6,24 \cdot 10^{-18} \text{ sec}^{-1} = 192,6 (\text{km} / \text{sec MPC})$$

i.e. it blends with the dispersion of values given by different authors [9] (see Table 2).

***The result received by us is good to explain the "red shift" without using of the idea on extension of the Universe!***

Table 2

#	Author	Year	H km/sec. MPC
1	E. Hubble	1929	530
2	V. Baade	1952	290
3	V. Baade, H. Swop	1955	100
4	E. Sandidge	1962	98
5	S. Vandenberg	1965	100
6	E. Sandidge	1968	75
7	E. Sandidge, G. Tammenn	1975	55
8	R. Tallu J. Fisher	1977	90
9	J. Voculaer	1979	100
10	G. Tammenn	1982	50
11	M. Aaronson	1982	85

***So, we got a connection between the mass of the Earth and time on the basis of Yarkovsky's hypothesis. Taking into account the formulas (1) and (14) we will get:***

$$\frac{dM}{dt} = \delta_N \cdot A_{av}^{1/3} \cdot M; \quad \frac{dg}{dt} = \frac{1}{3} \cdot \delta_N \cdot A_{av}^{1/3} \cdot g; \quad \frac{dR}{dt} = \frac{1}{3} \cdot \delta_N \cdot A_{av}^{1/3} \cdot R; \quad (26)$$

Thus, we obtained that speeds of growth processes of different physical parameters (mass and radius of the Earth, acceleration of free fall) are proportional to the values of these parameters. **Therefore, the value itself can serve as a measure of past time and the speed of change of the value of parameter as a measure of time rate.**

Really, the analysis of distributions of zones with increased value of acceleration of free fall on the Earth shows that location of all ancient civilizations get into these zones. It indicates the higher time rate of evolution in these regions, which contributed to the quicker development of cultures of these civilizations.

As it is known, acceleration of free fall is less in area near the pole in southern hemisphere of the Earth than

in north hemisphere on the value  $\frac{\Delta g}{g} = 30 \cdot 10^{-6}$ .

The difference in time of southern hemisphere from northern hemisphere on the segment of time  $\Delta t$  should correspond to this value according to the formula (26) and it is equal to:

$$\Delta t = 3 \cdot \frac{\Delta g}{g} \cdot \frac{1}{\delta_N} = \frac{3 \cdot 30 \cdot 10^{-6}}{0,76445 \cdot 10^{-16}} = 117,8 \cdot 10^{10} \text{ sec} = 37,33$$

thousand years.

Therefore, ***evolutionary processes in northern hemisphere should surpass the same processes in southern hemisphere.*** Actually, we know that the whole range of ancient animals like marsupials had already disappeared in northern hemisphere and remained only in southern hemisphere. From the other side, approximately all ancient civilizations existed only in northern hemisphere.

As it is known, in one's time it was supposed to make a analogy of time with the entropy of closed systems, which increases continuously like time does, to have a pictorial view of direction of time arrow.

However, the analysis made above, which relies on geological experimental data, shows that it is better to corre late the course of time with changes of mass and radius of the Earth as well as with the change of acceleration of free fall. These changes are connected with deep processes in Nature called by the inflow of some positive energy from the surrounding vacuum to the Earth and accordingly into nuclei of atoms.

***We should do only one step from the supposition on connection between time and process of energy inflow into nuclei of atoms to authentication of time with the flow of energy itself, and we will do it.***

So, let's suppose that time is some physical substance, which has positive energy and flows into nuclei of atoms from the surrounding vacuum. Thus, in our notions of time we share A.N. Kozyrev's opinion [5], which consider that internal energy of stars grows due to the flow of time.

Inflow of some physical substance, which has energy and momentum, into bodies from the surrounding vacuum should lead to their mutual attraction as it was shown in the works by V. Thomson, who proved that attraction between bodies appears in the case of simultaneous inflow of some liquid into these bodies as well as in the case of outflow. That's why, taking into account Thomson's results, **we can suppose that time represents a physical substance, which has positive energy and flowing into nuclei of atoms or has negative energy and flowing out of them.**

The case of outflow is more preferable since gravitation energy is negative, as we know.

This substance can be structured, for example, due to the wave process, i.e. it can represent a longitudinal wave, which enter nuclei or leave them. In this case an attraction between bodies also appears, as it was shown by K. A. Bjerknes [8].

In further works we will try to build a theory of gravitational interaction of bodies on the basis of Yarkovsky's hypothesis.

Where is the source of this substance-time? If we suppose that the surface of elementary particle separates our space from some other space, then the outflow of substance-time comes from another space to our space. In the case of three-dimensionality of these spaces we should speak about seven-dimensional space-time, which includes our and another Universe, and they are connected by the flow of substance-time.

***It is possible that this process of transmitting of substance-time and accordingly energy and mass from one Universe to another one takes place as periodical oscillation from one side to another.***

Transmission of signal by meaus of the flow of substance-time, i.e. modulation of this flow, can allow to produce an immediate communication between points of our Universe though the space of another Universe situated inside of elementary particles.

Thus, it is possible that the entire Universe is connected together through time and all processes of the universe are synchronized.

#### **Let's enumerate the results obtained in thr given work:**

1. The hypothesis by I.O. Yarkovsky on the reason of growth of mass and radius of the Earth is analyzed and its productivity is shown.
2. Numerical values of constants of growth of mass and radius of the Earth as well as acceleration of free fall are obtained.
3. The "red shift" is explained on the basis of Yarkovsky's hypothesis without attraction of hypothesis on expansion of the Universe.
4. Numerical value of Hubble's constant is obtained.
5. The explanation of correlation between location of ancient civilizations and zones of increased gravity is given.
6. The explanation of advanced evolutionary development of northern hemisphere of the Earth is given and time of this advance is calculated.

7. The notion of physical substance-time, which is the cause of growth of mass and energy of heavenly bodies, is introduced.
8. The supposition on nature of gravitational interaction of heavenly bodies due to physical substance-time is made.

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## Experiments on Change of the Direction and the Rate of Time

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Professor N.A.Kozyrev, Russia, who wrote some papers on causal or asymmetrical mechanics, made the first experimental study into the physical properties of Time. Experiments managing the direction and rate of Time were made. Since 1967 in Moscow Aviation Institute some research works were made under the direction of Professor Felix Yu. Zigel (up to his death in 1988) on UFOs, which had some technical forms. According to the work on State Budget topic "Preliminary researches on abnormal phenomena in the atmosphere" a lot of important information was collected on this phenomena. The information was used to determine connections between the cause and effect, and some physical processes were determined by authentic cases of traces and fragments, cinema and photos, and telemeter images of UFOs from 1987 up to the present time. There is data about influences of some parts of these objects and their body (surface of device) on the rate and direction of Time. To confirm this last statement a series of experiments was made with 4 types of laboratory systems (and in the present time one more system for new experiments is developed).

In experiments on deceleration and acceleration of physical Time in a small closed area of space (made since 1988) ***the effect of electromagnetic field influence on space-time continuum was tested***. The experimental system used to investigate such kinds of effects consists of a set of electromagnets connected in series and in parallel and they are installed on spherical surfaces. In various experiments from 3 to 5 Electromagnetic Working Surfaces (EWS) were used. All EWS layers of various diameters were installed inside each other (similarly to a Russian doll "matrioshka"). The maximum EWS size was about meter, the minimum EWS diameter (internal) was 115 mm, which is the quite sufficient to allow experiments

with some control equipment, detectors and animals (various kinds of insects and laboratory mouse) to investigate the so called effects of ***converging spherical electromagnetic waves***.

The measurements of Time rate were made by all known modern means of measurement: all kinds of electronic, quartz, mechanical, nuclear clocks were used; as well as the specially produced duplicated quartz generators (to compare frequencies of standard heat-shielded generators); fiber-optic line diodes and other ways were tested. Though some kinds of measuring devices, for example, quartz clock, can be influenced by other physical factors, the duplication method of measurement allowed us to reduce the error of measurement. Thus a change in the rate of Time was produced (Professor Kozyrev named this "density of Time"). We can write  $t/t_E$ , where " $t_E$ " is the normal Time of the Earth space and " $t$ " is the local Time inside of the experimental system. This change in the rate was detected as several seconds per hour, but in one experiment the deceleration of the Time was measured as minus 4 minutes per 8 hours (minus 30 sec per hour) due to some incompletely understood reasons. Slowing down of the rate of Time up to minus 1,5 sec per hour and acceleration up to plus 0,5 sec per hour was produced and explained. If we accept the usual Earth Time as  $t_E = +1$  it will become clear that we investigated a change in the speed of Time through a very small range:  $+0,99 < t/t_E < +1,01$ . So, the tested subjects and animals at any mode of operations (slowing down or acceleration) were moved into the Future faster or slower than those in normal space.

Through experiment it was established that the processes of slowing down and acceleration of Time are absolutely different. The slowing down of Time was smoother and steadier than acceleration, which showed sharp jumps. The mode of acceleration is unstable and it depends on some external factors. In particular, the instability of Time acceleration is connected to the period of day or night and also the Moon phase, probably to other reasons. One of the reasons is human presence near the Time Machine. Even small external effects, for example mechanical vibration, can produce a great result and change the value of the effect.



# Experimenting With Time

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*"The notion of Time should be kicked out from Physics."*  
Archimedes

1. All Physical and Biological Systems are naturally driven 'time-machines' with inbuilt internal times.

2. There are three levels of Time:

(a) "**General Time**" is infinite and essentially different and independent of Space and Matter; it is real, identical with a Being and exists beyond our sensory perception as non-spatial, dimensionless entity. It generates, underlies and governs all universal phenomena appearing nowhere directly as the apparent cause of change and can be experienced through consequential events, only. Moreover, this is nothing new – "General Time" works as any other known Natural Law, existing as a pure "Time Principle". It belongs to the realm of Metaphysics and its ontological definition is "Continuity". However, what is the most important to be comprehended and recognized, is its rank: The "Time Principle" is the most fundamental "Natural Law". Since it is dimensionless, the "quantum" concept is not applicable in its interpretation;

(b) "**Internal time**" is the "time code", which structures the Physical System and regulates its functioning, that means its reactive changing caused by external influences;

(c) "**Local time**" is the "time operator" or time condition external to the Physical System and if applied on it yields its new physical state. In the case of total rearrangement of the "internal time code", the "local time operator" generates an entirely new Physical System. Both internal and local times are given and fixed by units of the frequency set of Electromagnetic Spectrum and **that is exactly what the time-engineering makes possible and the time control achievable aim.**

3. **Why EM fields are affecting (and adjusting) the rate of time-flow in solid material objects?** It might be so because Matter itself ultimately consists of the same kind of fields (deeply cooling the solid matter, experimentation finally gets the wave pattern, which behaves as Light and can be manipulated in the same way). What is related with time: "hard" particle or "soft" wave? Since specific times are given by frequencies, there is no actual "dualism" of Matter, but only relative effects due to time-arrangement of the frequencies involved. The natural frequency calculus between the internal "time code" of the Physical System and applied local "time operator" creates properties of "softness"

and "hardness". Probably, each of the chemical elements of the Periodic System has its own specific "internal time code" and their interactions are basically "time – operations". Resonance is a synchronicity of structures. The ancient Greek philosopher Democritus conceived that "Atoms" can be of any size and there are worlds, which are built, of so big atoms that look to us as "empty" space and we are passing through them without knowing. Today we maybe need a better view on what are true atoms. "Atom" should be an elementary entity, indivisible under all conditions. Seems that it is the main property of the units of EM Spectrum; no matter how long it is, millimeter or kilometer, EM entity cannot be cut in parts. Modulation is the "time-shift" effect too. Modulated EM emission still exists in whole, but cannot be so perceived in a new "present" created by modulating field.

4. Arrow of time in Electromagnetic Spectrum: "Present" is established by the field, from which experiment begins (any frequency of the Spectrum can be used); higher frequencies are the "past"; lower frequencies are the "future". So, naturally given time orientation past-future in EM Spectrum is represented as traverse from higher to lower frequencies (of course, the same holds for "term" and "wave-length"). **Practically, there is no limitation in direction or rate of controlled time traveling.** Whenever the EM field is switched on by man, the new initial time condition - the local-time "Present" is created. The set of three EM fields is the most effective covering of all the three modes of time: past, present and future. But, even better results will be obtained if the experimenter isolates his experiment from inevitable spontaneous influence of natural EM fields - by additional, the fourth field of special characteristics. **If the experimenter applies EM fields of higher frequencies, the system will "travel" into the future; if lower frequency fields are applied, the system will be shifted into the past;** if applied EM fields are of the frequencies higher than those, which structure the system itself, it will be completely shifted into the future, it will disappear before the eyes of those who are subject to reference "present time"; if the system is exposed to low frequencies (according to the exact mathematical Law, which regulates all the time-shift occurrences), the system will start moving in leaps, jumping in the fields or disappear into the past. "Jumping" is just a macro-effect demonstrating the true nature of motion in general: it is exclusively discontinual (quantization of space is the only physical solution to Zenon's paradoxes). It should be stressed here that Maxwell's Electromagnetics does not cover these cases, neglects inherent time-properties of EM Spectrum and is very distant of any consideration on active role of time in electromagnetic events (**N. Tesla never used Maxwell's equations calling them "poetical"**).

5. If we take very ancient radically realistic approach towards mathematics, we shall get its profoundly new picture that would enable us to comprehend its enormous, but still unused power. Taken as a whole,

**mathematics is nothing else, but the hidden Science of Time** (not only Algebra is that as was already indicated by Hamilton). The representation of the dimensionless "General Time" in Geometry is "Point"; in Arithmetic it is "Zero". "Point" is the "General Time" image; "Zero" is the "General Time" number. Mathematical operations themselves are also non-spatial and dimensionless, they are of time-nature and the "Time Principle" is working through them, they are time-tools.

6. Geometrical and Arithmetical objects that have dimensions and quantities correspond to Space and Matter. Since the infinities cannot coexist (Melissus of Samos), if Time is infinite, Space and Matter must be finite. Space (or "Continuum" - ontological definition of Space as dimensional and finite) is structured of indivisible quanta of any length, arranged (rarified) by time. Range of Space quanta coincides with the range of EM Spectrum, **in fact, Space and EM Spectrum are identical, and they are the same.** "One" is Arithmetical quantum of Space and should be interpreted as any "present frequency" of EM Spectrum - frequency chosen to start the time-experiment. "One" could be of any length as in Euclidian Arithmetic - "one" is a "line". Kronecker was inspired stating that we should use only Natural Numbers ("created by God"). Indeed, using "one" as a "line" we can mathematically express the whole physical space. The 'length' has no preferential direction or position and from this follows that "spherical law" spontaneously generates a Sphere. To build the whole space, only one dimension - length (Diameter) and "spherical law" are necessary; other dimensions and Space properties appear with them. Natural Numbers (except "zero" - "General Time" and "one" - "line" or "quantum of space") correspond to internal and local times. But, if we look closely, we shall find that both internal and local times are contrary (mutually dependant) operators, which generate and conduct Space and Matter through constantly time-shifting. Time is also the cause of "eternal motion" in the Universe; the motion is asynchronicity like it is the change itself.

***Matter is a Number...***

7. Matter is a Number. Physical system is a special case of space-configuration subjected to only one and intrinsically harmonious internal "time code"; it is conducted (set into motion) by local "time operator", or external EM fields. (N. Tesla noted that there is no energy in the system besides that which is incoming from the environment - **"There is no energy in matter except that absorbed from medium."**)

Ball Lightning ("Fire Balls") is a primary natural macro-fusion. "Fire Balls" are synthesizing of EM fields by "time-mathematics" and can be stable structures under certain EM conditions. Material bodies are formed in the same way; the difference is only in complexity

(number of time-organized frequencies). The Law (Time) and the initial shape (spherical) are the same; varieties in size come from the constitutive frequencies and varieties in shape (deformations of the sphere) come from "local time operators" (external EM fields).

**8. In the entire History of Science, Kozyrev was the first who clearly pointed the deepest issue in Physics claiming that concepts of Force (and Energy, as well) are to be substituted by "Time", by formulation of the "Time Law". For him Time was a Force.** (Already Archimedes thought that notions of "Time" and "Force" suffer of overlapping contents and because of that both are indistinct; he also believed that leverage has "mystical" properties: longer physical leverage plus weight is heavier than the shorter leverage plus the equal weight, but needs less force to be operated. For Archimedes it demonstrates the unrevealed relation between Space and Force. However, let's consider the "mathematical leverage": its "hands" are dimensional, have length, but what about its "stand-point"? Is the dimensionless "stand-point" of a mathematical leverage - a Space, spatial? It doesn't look like that. Newton in "Principia" said: "The Absolute Time flows..." How comes that "motion of time" and what is its relation to Force? Newton was seeking for the "cause of Force".

9. In conclusion: contemporary theoretical research in Physics, especially in Cosmology, is deeply disconnected with Physical Reality. The Criteria of "natural limitations in mathematics" (Rene Thom) are to be reintroduced as strict physical interpretation of every symbol and formula used in physical experimenting. The role of Time is almost completely unknown. Time is considered inactive in experiments; there are no even its Hypotheses, not to mention the lack of any kind of its definition. The Relativity Theory cannot help very much, since Einstein started from the assumption that "Time isn't really existing". **But, according to the extremely important work of Vadim Chernobrov, the pioneer of intensive experimenting with the "change of rate of time flow" caused and controlled by EM fields, the path has been found leading to the full cognition and mastering of Time.** Soon it will be obvious that all the physical experiments are ultimately explainable as Time-based. Time generates Space and then Matter; it is the cause and conductor of all the cosmic change. **Successful experimenting with Time by EM fields is uncovering totally new fundament of Physics.** The valid, repeatable and easy measurable initial results in obtaining "Time-control" are not in question, there are more of them then we can recognize as such at the moment. However, the corresponding new mentality in Science needed to release ideas in support of the new, I would dare to say - "Time-shift Technologies" - is yet to come.

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# Practical Application of Time Rate Control (TRC) Theory

Alexander V. Frolov

In the modern World strategic balance of political forces is provided mainly due to military power. Not one country can be sure that use of weapons will remain without a response action from the enemy. Rather the contrary, this response action is unavoidable. Maintenance of this condition is a guarantee of some stability in the world. This condition is **an example of cause-effect relations**. In reality they have some probability or "extent of hardness". The period of delay and the scale of consequence describe this hardness of cause-effect connection. The power of these processes as well as the forms of cause-effect manifestation also can be different. The similar situation is observed not only in relations between states, but also on other levels of social relations, though the causality here is not so hard.

We can find the reflection of our desire to restore the justice in the principle of causality. We can assume that religious commandments, social rules of behavior for people and state laws written by people are the analogues of real physical mechanism. The space itself is designed according to this higher law. Let's remind also the law of momentum conservation, law of electromagnetic induction and its manifestation in the common electromagnetic transformer. Theory by N.A. Kozyrev [1] considers cause-effect relations from positions of the concept of active properties of time. In this concept the speed of the course of time is defined as a ratio of distance between the cause and the effect to the period of time delay between them. For our space it is equal to the product of the speed of light and the fine structure constant, i.e. the speed of the course of time is 137 times smaller than the speed of light. Let's note, that it is not the speed of motion in space, but the "rotation speed of the cause-effect connection". From the other hand, in his work [2] Dr. Shipov presents the mathematics of four-dimensional rotations and firstly introduces the notion of torsion fields. In my mind, there is a clear analogy between notion of four-dimensional rotations in torsion technologies and cause-effect transformations by Kozyrev.

Now let's try to clarify physical sense of the fine structure constant. This constant is known in physics mainly as a factor, related with ratio between own spin and orbital spin momentum of a particle. Besides, Dr. Spartak M. Polyakov in his work [3] described internal structure of photon. On his assumption, minimal prolongation of any electromagnetic quantum is equal to the product of the wavelength and ratio between the fine structure constant and the speed of light. So, the internal structure of photon according to Polyakov reflects the features of inner structure of space, which was described by Kozyrev. Also we have to note Dr. Rykov's work on the fine structure constant [4]. He showed that the Plank's constant depends on parameters of Ether and the fine structure constant, so **we can assume an analogy**

**between "structure element of Ether" and "elementary cause-effect connection"**. Also there is a clear analogy between Rykov's notion of "elasticity of Ether structure" and Kozyrev's "hardness of cause-effect connection", which in my view can be described as some probability.

These links between few theories had not been discussed before and now we have a conclusion, which first gives us theoretical grounds for the known supposition that light (electromagnetic wave, i.e. photon) and time are allied physical notions. So, it is possible to state the following: The fine structure constant is a factor, which related with present physical structure of our space-time. Another structure of space-time means changes of all constants and all properties of matter. It means other time and other matter. Physical properties of element of space-time (some "elasticity" or "hardness of cause-effect connection") defines Plank's constant, speed of light and speed of course of time (rate of cause-effect transformations). Since cosmic processes define the fine structure constant, then all physical properties of our real space are the effect of real cosmic processes. There is similar situation in micro world, in which the fine structure constant is described by parameters of own spin and orbital spin of an elementary particle. If now we have a real understanding of the fine structure constant, then it should be possible to create local space-time by means of special technical systems. Space-time engineering becomes an applied science. From this we can develop the practically valuable technologies.

There is a real way to confirm this conception. The cosmic processes (motion of planet, stars and other processes in Galaxy) are stable only for relatively short period of our observation and some variations should be detected for a long period of time. In the article "Search for Time Variation of the Fine Structure Constant" John K. Webb and other authors investigated possible variation **in the fine structure constant** [1]. Also in another article "Space-Time Variation of Physical Constants and Relativistic Corrections in Atoms" the author V. A. Dzuba reported on this topic [2]. Analysis of the light from distant quasars has shown that billions of years ago the fine structure constant was different at earlier times in the history of the Universe. Now the value "alpha"  $\alpha \cong 1/137$  is a little bit more than in the past.

According to Kozyrev, the speed of the course of time (rate of cause-effect transformations) can be calculated as

$$v = c \cdot \alpha \cong c / 137 \quad \text{F.1}$$

where  $c$  is the speed of light. Increase of the fine structure constant means an increase of the speed of the course of time for our space-time.

According to Kozyrev, there are two extreme cases of the cause-effect relations:

1. In classical mechanics the distance cannot be equal to zero, but time can be arbitrarily small, including

the situation, when it can be equal to zero. The speed of the time course in this case is equal to infinity.

2. In the atomic world vice versa the speed of the course of time is equal to zero since the distance can be equal to zero, but there is always some delay in time, which we should take into account.

Our real world occupies the intermediate position and it has a certain time course as a transformation of the cause to the effect. There is a conclusion: Modern World became more stable and its laws became more similar to classical mechanics laws due to strengthening of the causality. Also it is possible to state the following: at the beginning of our World, physical laws of its space-time were more similar to laws of quantum mechanics.

**It is possible to assume that changes in physical laws are related with changes of position of our real World in the Universe due to the cosmic processes of motion. In other words, from point of view of the Ether conception, it can be explained as some natural changes in density and other parameters of Ether wind in space of our planet for different stages of development of our Galaxy in the Universe.**

Let's consider how can we use this natural cause-effect mechanism of space to create teleportation systems or "an ideal weapon" and how it will work. But at first we should specify some notions.

So, the real World occupies the intermediate position between classical mechanical World and quantum World and we move from chaos of quantum World to the strengthening of the causality. Specific parameter of space is a certain speed of the time course as a transformation of the cause to the effect. N.A. Kozyrev supposed and showed in the series of experiments that for interaction of some systems with the flow of time we can expect the appearance of additional forces in these systems. Therefore, mechanical tensions and changes of full energy of the system can occur due to the changes of energy of the time course [1, p. 344]. We should note, that all material systems always exist in time and in this sense they always interact with time. **The cause of the appearance of additional forces is the asymmetry of the cause-effect energy relations.** It can be realized by means of various technical methods. We should also note that according to Kozyrev "...mechanics, which corresponds to the principles of causality, should be developed from the extreme case of Newtonian mechanics, but not from the quantum mechanic case. Some features, which are characteristic to the quantum mechanics, can appear during this process. For example, we can expect the appearance of the quantum effects in the macroscopic mechanics" [1, p.345].

Further we can turn to the consideration of new conception of defense. Let's suppose, that military system A stroke some system B. For the real World we should take into account, that there is some distance in space between systems A and B. Manifestation of the forces of causality is expected only in the irreversible

processes. That's why we suppose that the impact led to the irreversible processes in the system B. In such a way the common cause-effect connection will form a cycle.

Now let's suppose, that the system B could prevent the irreversible processes of its destruction by some technical way, for example, by means of anti-missile rocket. The cause-effect connection will form a cycle in this case also. It was made by certain actions in the period, when the system B was stricken, but the effect had not came yet. Theoretically it is possible since with the known speed of the time course for some real distance between the interacting systems, interval of time between the cause and the effect cannot be equal to zero. But in real situations instantaneous or sufficiently prompt reaction of the system B is not possible. Just rely on this aspect, the system A will try to reduce delay between "cause" and "effect" and distance between its military base and the system B.

New conception of weapon does not mean the repulse of the impact by some material counteraction, i.e. by means of some energy consumption. **Since it is impossible to do so that the cause-effect connection will not be closed (it will contradict to the laws of space structure), then it is necessary to close it artificially.** In other words, it is necessary to put in action the natural mechanism of causality before irreversible damages of the system B occurred.

**For more than defense action, it is possible to produce a response action to the system A through the natural mechanism of causality.** The effect (equivalent of missile action) should come in area of space, where the cause was, but a little bit later. Spatial matching of cause and effect in one point (with some interval in time) is possible in quantum mechanics, as we considered above. Therefore, the techniques being in arsenal of the system B should change the parameters of space (reduce the speed of the course of time in some area of space) in such a way, which allows the laws of quantum mechanics to work for the system A.

We can hardly suppose the possibility to create an artificial 100% quantum mechanic reality in macro world, but it can work even partly. In this case the effect will come in the same place, where the cause (system A) is situated. The real position of the cause in the Universe does not play any role. The energy of the system A should change due to the active properties of time. According to Kozyrev, these properties led to the appearance of an additional torsion moment in the experimental unit. On the micro-level it can mean that energy of atoms of matter will change in the area of cause and this will produce mechanical destruction of the system A.

**In any case it should lead to increase of entropy in area of space where the cause is situated.**

This effect is an analogy of change of the light beam trajectory on the boundary between two mediums of different index coefficient. With the full reflection the



whole momentum should return to the launching point of the missile, but not due to the return of the missile itself. The equivalent of this momentum returns due to the active properties of time and not in the form of the linear vector of speed, but in the form of additional energy, which is transferred to the particles of matter due to changes of the time course.

Only part of the momentum will return with the partial reflection. It will increase the entropy of all matter in area of the cause.

Technical realization of these principles depends on the final goal of the research work. To make it easier, the term "speed of the course of time" can be replaced with the notion of "density of ether" and "speed of the ether flow".

Another aspect is following. In area of space with changed time course, the changes in operation parameters of electronic equipment will not allow controlling the missile. Thus, this part of defense problem is solved also. We should note that Kozyrev's experiments already proved the influence of changes in the time course on the quartz oscillators, sensors, semiconductor elements and resistors. A number of other authors showed the influence of "radiation of a special kind", for example, torsion fields, to the speed of chemical reactions proceeding and physical properties of materials. Since the area of space with the changed properties can have significant sizes, then by means of this method we can provide the defense of large territories.

Technical realization of these principles depends on the final goal of the research work. To make it easier, the term "speed of the course of time" can be replaced with the notion of "density of ether" and "speed of the ether flow". A number of authors consider time as a result of motion in ether. Really, the Galaxy, stars and planets move in the universal medium. From this point of view we can consider one more useful analogy. The known Archimedes' law defines the forces acting on the body, which is immersed into some liquid.

The analogy between ether and liquid is considered and experimentally proved by Dr. Alexander M. Mishin [7] and others.

Further we can turn to the forces analogous to Archimedes' forces and they act to the area of space

with the changed course of time. Due to these forces, this **area of space will be forced out in some direction**. It is known that the balloon is forced out from the dense air in the direction of the rarified one. There is a question: is the area of slowed time the more dense ether or more rarified ether?

According to Kozyrev, the following terminology is accepted now: matter acquires more ordered structure (less entropy) in the area of high density of time [1, p. 387]. Usually time course is directed from the past to the future and in this case the entropy always increases. That's why the decrease of entropy corresponds to the decelerated time course and to the area of high density of time.

From the ether conception we can get the same conclusion. Besides, we get a number of technical details. More dense ether means more number of ether elements in the same volume. Earlier we considered time as an order of elementary cause-effect connections.

Thus, we can make an important conclusion: the elementary cause-effect connection is an element of ether (graviton in some conceptions), which was the subject of many scientific researches. In full accordance with Kozyrev's theory, the denser ether, the more elementary cause-effect connections are required for the same action. That's why the time course is slowed in more dense ether.

The area of accelerated time course should be forced out in the direction of the rarified ether. Analogously, the area of slowed time is forced out in the corresponding direction, to the more dense ether. It is a theoretical basis to create the teleportation systems.

On the basis of these considerations it is possible to design new defense systems and principally new transport systems.

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constituent of bigger system, until everything is embraced by the Biggest System, that is the Universe.

The seventh principle of the universal energy interchange is the physical realization of the law of unity and struggle of oppositions. This principle determines spontaneous creation of thermodynamic and antigravitation potentials. Any local matter mass (a body), situated in the open space, creates an exchange process with the surrounding aether volume in the way that more fine-structure fluid aether is absorbed by the body, and the less power-consuming gas aether is radiated. As the result the body as a heat engine gets energy due to the cooling of aether exteriors. At that, antigravitation forces acts between bodies and aether exteriors, which have different temperature.

This principle, which establishes the existence of antipodes of the second law of thermodynamics and Newtonian attraction, is realized mainly in cosmic scales and explains in which way the energy is created in the bowels of planets and stars and why the Universe is stable as regards to gravitation. Obviously, the most unexpected for the modern Physics is the discovery of non-traditional nuclear processes where conditional reactions of decay and fusion occur at the usage of quasimatter.

More deep research of new experimental results and of the stated above scientific principles lets to determine the priority-driven strategic tendencies in Physics, to open more entirely the laws of mechanics and

thermodynamics of many-dimensional aether, including the theory of non-traditional waves and new types of electromagnetism. At that, the supreme aim is the research of differences in aetherodynamics laws on the Earth (in a laboratory) and in outer space, the unknowing of these differences has caused logical insularity, false all-sufficiency of classical physics, which had refused as "not wanted" the aether conception and fundamental Universal laws.

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## Irving Langmuir and Atomic Hydrogen

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### *Editorial*

*In this paper Dr. Nicholas Moller describes the history of development of Atomic Hydrogen technologies in details. It is remarkable that this technology can be applied not only for welding processes but also as a clean free energy source. It is important to note that in this case the hydrogen process does not involve a consumption of hydrogen, which is not combusted in the process. Atomic hydrogen is not really a fuel but rather a medium, gateway or a super-conductor of ZPE form the vacuum of space, converting ZPE radiation and ultra-high frequency electrical energy into infrared (heat) radiation.*

This is the story of Irving Langmuir who was the first to develop a theory on Atomic Hydrogen on the basis of empirical research and experimentation. His work in this field lasted from 1909 to 1927. During this period he was employed by the Research Laboratory of General



Irving Langmuir.

Electric Company. Patents and discoveries developed by Langmuir during his time with General Electric were to a considerable extent instrumental in laying the foundations for what is today one of the largest corporations in the world.

The question that gave birth to this article, is why his work and discoveries on Atomic Hydrogen were the only work that received hardly any attention at all and why his revolutionary breakthrough was deprived of world attention for almost 100 years? This question becomes even more relevant when taking into consideration the high standing he enjoyed with his contemporaries (including being awarded the Nobel Prize in Chemistry)

and with his employers, which is an acknowledgement of the high commercial value of all his other work.

The answer to this question is given through a detailed account of his work on Atomic Hydrogen and followed by suggestions for new applications of Atomic Hydrogen in the field of CLEAN SUSTAINABLE ENERGY.

Irving Langmuir was born in Brooklyn, New York, on January 31, 1881, as the third of four sons of Charles Langmuir and Sadie, nee Comings. His early education was obtained in various schools and institutes in USA, and in Paris (1892-1895). He graduated as a metallurgical engineer from the School of Mines at Columbia University in 1903. Postgraduate work in Physical Chemistry under Nernst in Göttingen earned him the degree of M.A. and Ph.D. in 1906.

Dr. Langmuir returned to America and became an Instructor in Chemistry at Stevens Institute of Technology, Hoboken, New Jersey, where he taught until July 1909. Then he entered the Research Laboratory of General Electric Company at Schenectady where he eventually became an Associate Director.

Langmuir's studies embraced chemistry, physics, and engineering and were largely the outgrowth of studies of vacuum phenomena. In seeking the atomic and molecular mechanisms of vacuum phenomena he investigated the properties of adsorbed films and the nature of electric discharges in high vacuum and in an environment of certain gases at low pressures.

His work on filaments in gases led directly to the invention of the gas-filled incandescent lamp and to the discovery of atomic hydrogen. Later he applied his knowledge of atomic hydrogen in the development of the atomic hydrogen welding process.

He was the first to observe the very stable adsorbed monatomic films on tungsten and platinum filaments, and was able, after experiments with oil films on water, to formulate a general theory of adsorbed films. He also studied the catalytic properties of such films.

Langmuir's work on space charge effects and related phenomena led to many important technical developments, which have had a profound effect on later technology.

In chemistry, his interest in reaction mechanism caused him to study structure and valency, and he contributed to the development of the Lewis theory of shared electrons.

Some of the awards he received include: Nichols Medal, (1915 and 1920); Hughes Medal (1918); Rumford Medal (1921); Cannizzaro Prize (1925); Perkin Medal (1928); School of Mines Medal (Columbia University, 1929); Chardler Medal (1929); Willard Gibbs Medal (1930); Popular Science Monthly Award (1932); Nobel Prize in Chemistry (1932)(Although Niels Bohr recommended

him for the Nobel Prize in Physics, Langmuir was awarded the Prize for Chemistry. A fact that most probably bears relation to the efforts of ignoring the importance of his discoveries on the properties of Atomic Hydrogen.)'; Franklin Medal and Holly Medal (1934); John Scott Award (1937); "Modern Pioneer of Industry" (1940); Faraday Medal (1944); Mascart Medal (1950).

In addition, he was a Foreign Member of the Royal Society of London, Fellow of the American Physical Society, Honorary Member of the British Institute of Metals, and a member of the British Chemical Society (London). He had served as a President of the American Chemical Society and as a President of the American Association for the Advancement of Science.

Honorary degrees were bestowed upon Langmuir by the following colleges and universities: Northwestern, Union, Edinburgh (Scotland), Columbia, Kenyon, Princeton, Lehigh, Harvard, Oxford, Johns Hopkins, Rutgers, Queens (Canada), and Stevens Institute of Technology.

Dr. Langmuir's hobbies were mountaineering, skiing, flying. However, his biggest hobby and life passion was the pursue of the understanding of the mechanism of simple and familiar natural phenomena.

He married Marion Mersereau in 1912. They had a son, Kenneth, and a daughter, Barbara. He died on August 16, 1957 after a short illness.

### **General Electric Company**

Langmuir first entered the Research Laboratory of General Electric Company in summer, 1909, expecting that by fall he would return to Stevens Institute, where he had been teaching chemistry. Instead of assigning him to any definite work, Doctor Whitney who headed the Lab suggested him to spend several days in various rooms of the laboratory, becoming familiar with the work that was carried out there. Dr. Whitney also asked him to let him know what he found the most interesting as a problem for the summer vacation.

A large part of the laboratory staff was busily engaged in the development of drawn tungsten wire made by new Coolidge process. A serious difficulty was being experienced in overcoming the "offsetting" of the filaments. It was a kind of brittleness, which appeared only when the alternating current was run through lamps. Out of a large number of samples of wire, three had accidentally been produced which gave lamps that ran equally well with alternating and with direct current, but there was no explanation as to what had made these wires so good. It seemed to Langmuir that there was one factor that had not been considered, which was, that the offsetting possibly was due to impurities in the wire in the form of gases. He therefore suggested to Doctor Whitney that he would like to heat various samples of wire in high vacuum and measure the quantities of gas obtained in each case.

When he observed the laboratory, he had been particularly impressed with the remarkably good methods that were used for exhausting lamps. These methods were, he thought, far better than those known to scientific research workers of this time. His desire to become more familiar with these methods was undoubtedly one of the factors that led him to select an investigation of the gas content of wires for his first research.

After starting the measurements that he had planned, he found that filaments gave surprisingly large quantities of gas. Within a couple of weeks he realized that something was entirely wrong with his apparatus, because from a small filament in a couple of days he obtained a quantity of gas which had, at atmospheric pressure, a volume 7000 times that of the filament from which it appeared to have come; and even then there was no indication that this gas evolution was going to stop.

At the time one could find in the literature - for example in J. J. Thomson's book on the "Conduction of Electricity through Gases" - many statements that metals in vacuum give off gases almost indefinitely, and that it is impossible to free metals from gas by heating. Still he thought that 7000 times its own volume of gas was an entirely unreasonable amount to obtain from a filament. He spent most of the summer trying to find where this gas came from, and did never investigate the different samples of wire to see how much gas they contained. To any other researcher, it would have been much more logical if he had dropped the work as soon as he found that he would not be able to get useful information on the "off-setting" problem by the method that he had employed. Instead Langmuir continued working.

What he really learned during that summer was that glass surfaces, which have not been heated a long time in vacuum slowly, give off water vapor, and this reacts with a tungsten filament to produce hydrogen. At the same time, the vapors of Vaseline from a ground-glass joint in the vacuum system give off hydrocarbon vapors, which produce hydrogen and carbon monoxide.

This summer work was so interesting to him that he dreaded to return to the comparative monotony of teaching, and gladly accepted Doctor Whitney's offer to continue working at the laboratory. No definite program of work was laid down. At first he was given one assistant and then others to continue experiments on the sources of gas within vacuum apparatus, and a study of effects produced by the introduction of various gases into tungsten filament lamps. The truth is that he was merely curious about the mysterious phenomena that occurred in these lamps. Doctor Whitney had previously found that gases had a habit of disappearing in lamps, and no one knew where they went to, so Langmuir wanted to introduce each different kind of gas, which that he could lay his hands on, into a lamp with a tungsten filament and definitely find out what happened to that gas.

It was the universal opinion among the lamp engineers with whom he came in contact that the better vacuum could be produced in a lamp, the better lamp would be. Doctor Whitney, particularly, believed that every effort should be made to improve vacuum, for all laboratory experience seemed to indicate that this was the hopeful line of attack on the problem of a better lamp. However, Langmuir really didn't know how to produce a better vacuum, and instead proposed to study the bad effects of gases by putting gases in the lamp. He hoped that in this way he would become so familiar with the effects of these gases that he could extrapolate gas pressure to zero, and thus predict, without really trying it, how good the lamp would be if they could produce a perfect vacuum.

He found this principle of research to be extremely useful on many occasions. When it is suspected that some useful result is to be obtained by avoiding certain undesired factors, but it is found that these factors are very difficult to avoid, then it is a good idea to increase one of these factors so as to exaggerate their bad effects, and thus become so familiar with them that one can determine whether it is really worth while avoiding them. For example, if you have vacuum in lamps as good as you know you can produce, but suspect that lamps would be better if you had vacuum, say, 100 times as good it may be the best policy, instead of attempting to devise methods of improving this vacuum, to spoil the vacuum deliberately in known ways, and you may then find that no improvement in vacuum is needed or just how much better the vacuum needs to be.

During these first few years, while he was thus having a good time satisfying his curiosity and publishing scientific papers on chemical reactions at low pressures, he frequently wondered whether it was fair that he should spend his whole time in an industrial organization on such purely scientific work, for he didn't really see what applications could be made of it. Several times he talked the matter over with Doctor Whitney, saying that he could not tell where this work was going to lead them. Whitney replied that it was not necessary, as far as he concerned, that it should lead anywhere. He would like to see him continue working along any fundamental lines that would give them more information in regard to the phenomena taking place in incandescent lamps, and that he should feel himself perfectly free to go ahead on any such lines, which seemed to be interesting to him. He had been working for nearly three years in this way with several assistants working for him before any real application was made of any of his work. In adopting this broadminded attitude Doctor Whitney showed himself to be a real pioneer in the new type of modern industrial research known as *Free Research*, and thus made Langmuir the first scientist in modern history, who got tools and resources for free research.

He had to devise new types of vacuum apparatus for his study of the effect of gases. He needed particularly to be able to analyze the small quantities of gas that



existed in the tungsten lamp. With some of this special apparatus he was able to make a practically complete quantitative analysis of an amount of gas, which would occupy about  $1\text{mm}^3$  at atmospheric pressure. In this sample of gas they could determine the percentages of oxygen, hydrogen, nitrogen, carbon dioxide, carbon monoxide and inert gases.

In regard to the behavior of the different gases, which he introduced into the lamp bulb, he found that no two gases acted alike. For example, Oxygen attacked the filament and formed tungstic oxide,  $\text{WO}_3$ . It seemed to be simple enough, but the kinetics of the reaction presented many features of considerable scientific interest.

During the studying of the effect of hydrogen he observed very peculiar phenomena. A limited amount of hydrogen disappeared and became adsorbed on the bulb, where it remained in a chemically active form, which was capable to react with oxygen at room temperature even long after the tungsten filament had been allowed to cool. These suggested hydrogen atoms and seemed to confirm some conclusion, which Langmuir had already drawn from observations on the heat losses from tungsten filaments in hydrogen at atmospheric pressure. During the making squirted tungsten filaments, and sometimes during the cleaning of the drawn wire, filaments were heated in this manner in hydrogen. Because tungsten filaments melt at a temperature  $1500^\circ\text{K}$  above the melting point of platinum, it seemed to him that **tungsten** furnished a tool of particular value for the scientific study of phenomena in gases at high temperatures. From his work on lamps he knew the approximately relation between the electrical resistance of tungsten wire and its temperature, and could thus use a tungsten wire as a kind of resistance thermometer. By connecting a voltmeter and an ammeter to the tungsten filament, which was being heated in hydrogen, he could determine the temperature as well as find the heat loss from the filament in watts. He wanted to see if anything abnormal happened when the temperature was raised to the extremes, which were only possible with tungsten.

The results greatly interested him, because they showed that the energy loss through the gas was proportional to the square of the temperature up to about  $1800^\circ\text{K}$ . Then they increased at a much higher rate above that, until at the highest temperatures the energy loss was proportional to about the fifth power of the temperature. This result could only be explained if hydrogen at high temperatures was dissociated into atoms.

***The diffusion of the hydrogen atoms from the filament, and their recombination at a distance from it, would cause an enormous increase in heat conduction.***

After publishing these preliminary results, he was naturally very interested in getting more information

about the properties of these hydrogen atoms. A large number of experiments, lasted over several years, were thus made in this study of atomic hydrogen. Nearly all of these experiments would seem quite useless, or even foolish, to a man who was making a direct and logical attack on the problem of improving of tungsten lamps.

When nitrogen at low pressure was introduced into a bulb containing a tungsten filament at extremely high temperatures, such as  $2800^\circ\text{K}$ , the nitrogen disappeared at a rate, which was independent of its pressure. This suggested that the reaction velocity was limited by the rate at which the tungsten evaporated from the filament. To check this hypothesis the rate of loss of weight of filaments at various temperatures was measured in perfect vacuum. This rate varied with the temperature in accordance with known thermodynamic laws, and it was concluded that the loss of weight was really due to evaporation but not to chemical action of residual gases or to electric currents, which passed from the filament to the surrounding space.

A comparison of the rate of disappearance of nitrogen with the loss of weight in the filament showed that one molecule of nitrogen disappeared for every evaporated atom of tungsten. A brown compound,  $\text{WN}_2$ , was formed, which deposited on the bulb and decomposed when water vapor was introduced, forming ammonia gas.

From time to time the question kept arising - how good would a lamp be if it had a perfect vacuum? And now he got an answer. Hydrogen, oxygen, nitrogen, carbon monoxide, and in fact every gas that he introduced, with the exception of water vapor, did not produce blackening of the lamp bulb. The serious blackening that occurred with only small amount of water vapor depended upon a cyclic reaction in which atomic hydrogen played an essential part. Molecules of water vapor in contact with the hot filament produced a volatile oxide of tungsten and hydrogen was liberated in atomic form. The volatile oxide deposited on the bulb where it was reduced to the metallic state by the atomic hydrogen, while the produced water vapor returned to the filament and caused the action to be repeated indefinitely. Thus, a minute quantity of water vapor may cause a relatively enormous amount of tungsten to be carried to the bulb.

The question then arose whether the amount of water vapor, which might still exist in a well-exhausted lamp, were responsible for the blackening which limited the life or the efficiency of many of these lamps. They made some tests in which well-made lamps were kept completely immersed in liquid air during their life, so that there could be no possibility of water vapor coming in contact with the filament. The rate of blackening, however, was exactly the same as if no liquid air had been used.

Having thus proved that the blackening of a well-made lamp was due solely to evaporation, he could conclude

with certainty that the life of the lamp would not be appreciably improved even if they could produce a perfect vacuum.

Early in 1911 William Stanley, one of the pioneers in the electrical industry, felt that General Electric should do more fundamental work in connection with heating devices. Since Langmuir had become interested in the physics of heat losses from filaments in gases, he was glad to work along these lines and therefore undertook to direct a small laboratory at Pittsfield, Massachusetts, USA, where he spent about two days a week. Besides studying heat losses from plane surfaces at various temperatures he measured heat losses from wires of various sizes in air at different temperatures, working at first with platinum wires, and was able to develop a theory of heat losses, which enabled him to calculate the loss from a wire of any size at any temperature in any gas, provided of course, that the gas did not dissociate at high temperatures.

Having now a definite theoretical basis to calculate the normal heat loss by convection, he was able to prove that the abnormal rate of heat loss previously observed with tungsten filaments at high temperatures in hydrogen was due to actual dissociation; in fact he was able to calculate the heat of dissociation and the degree of dissociation at different temperatures.

In order to confirm these conclusions, he undertook experiments with heated tungsten wires in mercury vapor at atmospheric pressure to measure heat losses under such conditions. A little later he experimented with nitrogen and found that nitrogen did not dissociate either. In both of these gases the filaments could be maintained at temperatures close to the melting point for a far longer time than if heated in vacuum at the same temperature. Thus the rate of evaporation was greatly decreased by the gas, many of evaporating tungsten atoms being brought back to the filament after striking the gas molecules.

By this time he was familiar with all harmful effects, which gas can produce in contact with filaments and knew under what conditions these bad effects could be avoided. In particular, he realized the importance of avoiding even almost infinitesimal amount of water vapor. Thus, when he found a marked effect of mercury vapor and nitrogen in reducing the rate of evaporation, it occurred to him that it might be possible to operate a tungsten filament in gas at atmospheric pressure and obtain a long useful life. Of course, it would be necessary to raise the temperature far above that at which the filament could be operated in vacuum in order to compensate the serious loss in efficiency due to convection. Whether or not the increased rate of evaporation, due to this increase in temperature, would be more important than the decrease in the rate due to the gas was a matter that could only be tested by experiment.

After a series of detailed experiments, they were soon able to make lamps having a life of over 1000 hours with

efficiency about of 80 to 40 percent better than could have been obtained with filaments in vacuum. General Electric made astronomic fortunes out of this result.

**The invention of the gas-filled lamp is thus nearly a direct result of experiments made for the purpose of studying atomic hydrogen.** Langmuir had no other objective in view when he first heated tungsten filaments in gases at atmospheric pressure. Even at the time that he made these experiments at higher pressures, they would have seemed to him useless if his prime objective had been to improve the tungsten lamp. However, as it turned out, this preliminary work, not only produced a superior lamp but also resulted in the following important conclusions:

- The energy loss from heated wires in various gases can be readily calculated by simple equations.
- For nitrogen and mercury vapor the results calculated in this way agree well with experimental results up to temperatures as high as 3500°K.
- With air and carbon dioxide similar agreement was obtained up to the melting point of platinum.
- In the case of hydrogen, however, there was agreement only up to about 2100°K. Above that the energy loss increased extremely rapidly such that at 3300°K it was four or five times the calculated value.
- This was explained by assuming that hydrogen at very high temperatures is dissociated into atoms.
- A theory of the heat conductivity of a dissociating gas was developed.
- The heat of reaction and the degree of dissociation at various temperatures was thus calculated.

Experiments at low pressures proved that the phenomenon was a true dissociation, and that the volume of the dissociation products was approximately twice the volume of the original hydrogen. That is, the dissociation took place according to the equation  $H_2 \rightarrow 2H$ .

- There was much evidence that the dissociation was not electrolytic.
- Nitrogen, even at 3500°K, was not dissociated at atmospheric pressure. That is, its dissociation did not exceed 5%, at 3500°K.
- The following quantitative results were obtained. The heat of reaction at constant volume for  $2H \rightarrow H_2$  was 550,000 joules, or 130,000 calories. At constant pressure it was approximately 575,000 joules, or 136,000 calories at 3000° K.
- The degree of dissociation at any temperature,  $T$ , was given by the equation

$$\log \frac{p_1}{\sqrt{P - p_1}} = 2.665 - \frac{14,400}{T} + \frac{1}{2} \log T$$

Here  $p_1$  is the partial pressure of the hydrogen atoms (in atm), and  $P$  is the total pressures (in atm).

From this equation the free energy of formation of hydrogen molecules from atoms can be calculated.

### Flames of Atomic Hydrogen

Armed with fresh knowledge, Langmuir continued his work exploring the new phenomenon of Atomic Hydrogen and found that the heat carried away from an incandescent wire by a surrounding inert gas at ordinary temperatures increases roughly in proportion to the 1.9 power of the absolute temperature  $T$  of the filament. This relation holds, for example, for such gases as nitrogen, argon, and mercury vapor up to the temperature of melting tungsten, 3660°K.

In the case of hydrogen, however, abnormal results were obtained in experiments made at high temperatures. Up to about 1700°K the normal exponent of 1.9 was observed, but at higher temperatures the exponent increased until at 2600°K and above it was about 5.0. At 3400°K the heat conducted by hydrogen was twenty-three times as high as that carried by nitrogen under similar conditions.

Nernst in 1904 had developed the theory of heat conduction in a dissociating gas and had shown that dissociation results in a great increase in the heat conductivity. The dissociation products diffuse from the hot portions of the gas into the cold portions and there, by recombining, give up the large energy of the reaction. This suggested, as mentioned earlier that the abnormal heat conductivity of hydrogen at high temperatures was due to dissociation of the hydrogen into atoms according to the reaction  $\text{H}_2 \rightarrow 2\text{H}$ .

By means of theoretical considerations it was possible to determine the degree of dissociation and the heat of the reaction by which atoms combine to form molecules. The results that were published in 1915 gave 90,000 calories as the heat of combination of 2 grams of hydrogen atoms at constant pressure and at 3000°K. The degree of dissociation,  $X$ , expressed as the fraction of the molecules which have been dissociated, was found to be, at atmospheric pressure, 0.00165 at 2000°K, 0.0109 at 2400°K, and 0.0421 at 2800°K.

Niels Bohr, one of the most prominent theoretical physicist of the time and a close friend of Langmuir, calculated in a valuable and wonderfully suggestive paper on the Constitution of Atoms and Molecules (*Phil. Mag.* XXVI, p.863, 1913), the heat of formation of hydrogen molecules from the atoms to be 60,000 calories per gram-molecule. He pointed out that this value was "considerably less than the value of 130,000 found by Langmuir (*J. Amer. Chem. Soc.* XXXIV, p. 860, 1912) by

measuring the heatconduction through the gas from an incandescent wire in hydrogen."

In order that the results obtained by Langmuir should not bear false evidence against the theory derived by Dr. Bohr, he gave a preliminary account of some more recent measurements carried out by Mr. G.M.J. Mackay and himself, on the dissociation of hydrogen.

The method adopted was similar to that previously used, namely, to determine the heat-loss from electrically heated tungsten wires in hydrogen. In these experiments, however, very much greater care was used in determining the temperatures of the wires and in obtaining extremely pure hydrogen. Pressures of hydrogen ranging from 1 mm up to 760 mm of mercury were used. Still further experiments were made at pressures from 0.01 mm up to 20 mm pressure.

The measurements at low pressures gave very interesting results: At about one-tenth of an atmospheric pressure in hydrogen, the total heat-loss from filaments heated to very high temperatures (3000°K) was several times as great as in hydrogen at atmospheric pressure.

By subtracting the heat-loss due to *normal* heat-conduction from the *total* observed heat-loss, the heat carried by diffusion of hydrogen atoms was obtained. By plotting the logarithm of this quantity against the reciprocal of the absolute temperature, straight lines were obtained in each experiment. The slopes of all these lines were practically equal, no matter what pressure of the hydrogen was used (above 10 mmHg).

On the assumption that the diffusion coefficient varies with the 3/2 power of the temperature, this lead to the result that the heat of formation of hydrogen is about 76,000 calories per gram-molecule, as against 130,000 previously found. The reason for the high value of the latter figure is that it was based on a calculation of the actual value of the diffusion coefficient of hydrogen atoms through ordinary hydrogen. These results showed that the actual degree of dissociation was much smaller than that previously found, and that even at 3500°K hydrogen was probably not dissociated to a very great extent.

Further measurements finally suggested the heat of recombination to be 90.000 calories per gram/molecule, that is still a value of extraordinary proportions.

### Chemical Properties of Atomic Hydrogen

While the measurements of the heat losses from filaments in hydrogen were being made, other experiments showed that hydrogen which had been in contact with heated filaments acquired entirely new chemical properties, and they were quite in accord with those to be expected of an atomic form of the element.

A very remarkable phenomenon occurred when a mixture of oxygen and hydrogen at low pressure was admitted to a bulb containing a filament at 1500°K. The

oxygen reacted with the filament rapidly to form  $WO_3$ , which evaporated at this temperature as fast as formed. The oxygen thus cleaned up at a rate proportional to its own pressure and the pressure of oxygen thus fell to half value about every 2 minutes in a bulb of ordinary size. All this occurred exactly as if no hydrogen were present. During this time there was no measurable disappearance of hydrogen. After 10 or 15 minutes the oxygen was nearly all gone and then for 5 or 10 minutes more the gas pressure remained apparently constant and corresponded exactly to that of the hydrogen which was admitted.

Then suddenly, when the pressure of oxygen was low enough ( $10^{-9}$  mm), the hydrogen pressure began to drop by dissociation and in a few minutes the pressure fell practically to zero. Water vapor has an effect similar to oxygen in preventing the dissociation of hydrogen. At filament temperatures of  $1750^\circ\text{K}$  some of the hydrogen disappeared while the oxygen was cleaning up, but the kink in the curve still occurred when the oxygen was gone. **Water vapor and oxygen are thus powerful catalytic poisons for the reaction of the hydrogen dissociation.**

#### **Arcs in Hydrogen at Atmospheric Pressures**

Several years earlier in the General Electric laboratory studies were made of arcs between tungsten electrodes in various gases. Arcs in hydrogen were remarkable because of the high voltage drop and small cross section. A 10-ampere, direct-current arc between heavy tungsten electrodes about 7 mm apart in a bulb containing pure hydrogen at atmospheric pressure appeared as a sharply defined, brilliant red line about 0.5 mm in diameter along which the potential gradient was 150 volts per centimeter, making a power dissipation of 1500 watts per centimeter of length, this being about fifteen times as great as in nitrogen or argon. This abnormal behavior of hydrogen was then attributed to the dissociation which apparently carried energy so rapidly out of the arc.

#### **Arcs in Hydrogen at Low Pressures**

In attempting to obtain the Balmer spectrum of hydrogen without contamination by the secondary spectrum, they built very long vacuum tubes of moderate bore, in which they passed currents as large as 20 amperes through moist hydrogen at about 0.5 mmHg pressure. They observed many remarkable phenomena. Short pieces of tungsten wire projecting into the discharge were heated to incandescence, although a fine thread of glass or a platinum wire in a similar position was apparently not heated by the discharge.

On drying the hydrogen with phosphorus pentoxide the secondary spectrum (due to molecular hydrogen) appeared strongly and the Balmer spectrum (due to atomic hydrogen) nearly disappeared. The heating of the tungsten wire was also prevented by drying the hydrogen.

In correspondence with Professor Wood, Langmuir pointed out that oxygen and water vapor decrease the rate of dissociation of hydrogen in contact with tungsten and must thus also tend to prevent the recombination of hydrogen atoms on a tungsten surface. He also suggested that moisture poisons the catalytic activity of the dry glass surfaces that otherwise converts atomic into molecular hydrogen. Thus with moist hydrogen the tube becomes filled with nearly pure atomic hydrogen and the diffusion of this to the catalytically active tungsten wire causes the heating of the latter. Calculations based on the measured heat of dissociation proved that a pressure of only 0.16 mmHg of atomic hydrogen at  $500^\circ\text{C}$  would suffice to maintain a tungsten filament at  $2400^\circ\text{K}$ .

These conclusions were confirmed by Wood's observations that the walls of the tube became only slightly heated if the hydrogen was moist, whereas they were strongly heated with dry hydrogen. A tungsten wire was heated red hot even when mounted in a side tube (of 5 mm diameter) at a distance of 4 cm from the discharge tube, showing that the hydrogen atoms could diffuse in relatively large quantities out of the discharge.

**It occurred to Langmuir that it should be possible to obtain even higher concentrations of atomic hydrogen by passing powerful electric arcs between tungsten electrodes in hydrogen at atmospheric pressure and this atomic hydrogen could be blown out of the arc by a jet of molecular hydrogen directed across the arc.**

#### **Preliminary Experiments with Flames of Atomic Hydrogen**

To try out the possibility of blowing atomic hydrogen out of an arc, 20 - ampere arcs from a constant-current transformer were passed between two tungsten rods of 6mm in diameter mounted transversely in a horizontal alundum tube (10 cm diameter) through which a stream of hydrogen flowed. With voltages from 300 to 800V, arcs could be maintained with electrode separations up to 2 cm. The magnetic field of the arc caused the hydrogen to move transversely so that it became fan-shaped. Iron rods 2 or 3 mm in diameter melted within 1 or 2 seconds when they were held 3 to 5 cm above the arc.

By directing a jet of hydrogen from a small tube into the arc, the atomic hydrogen could be blown out of the arc and formed an intensely hot flame. To maintain the arc in a stable condition the electrodes were brought close together (1 to 3 mm), but the arc did not remain entirely between the electrodes, but extended as a fan to a distance of 5 to 8 mm. The flame of atomic hydrogen, however, extended far beyond the arc.

Molybdenum (m.p.  $2900^\circ\text{K}$ ) easily melted at distances of 1 or 2 cm from the arc. Near the end of the arc tungsten rods and even sheet tungsten (m.p.  $3660^\circ\text{K}$ ) could be melted.



**The use of hydrogen under these conditions for melting and welding metals proved to have many advantages. Iron can be melted without contamination by carbon, oxygen, or nitrogen. Because of the powerful reducing action of the atomic hydrogen, alloys containing chromium, aluminum, silicon, or manganese can be melted without fluxes and without surface oxidation.**

#### **Temperature of Atomic Hydrogen Flame Compared with Other Flames**

Let us suppose we could obtain atomic hydrogen in bulk at atmospheric pressure and room temperature and that we could then let this "burn" to the molecular form in a flame. What would be the temperature of this flame and how would it compare with that of other flames? Taking the heat of reaction (for 2 grams) to be 98,000 calories and taking the specific heat of molecular hydrogen (for 2 grams) to be  $6.5 + 0.0009 T$ , we find that the heat of the reaction would be sufficient to heat the hydrogen to 9200°K.

The dissociation of the hydrogen, however, would prevent the temperature from rising to any such high value. If  $x$  is the degree of dissociation at the maximum temperature reached, the available heat of recombination is only  $(1-x)$  98,000.

**Langmuir plotted two curves based on his accumulated data. These two curves intersected at  $T = 4030^\circ\text{K}$  and  $x = 0.642$ . Thus atomic hydrogen at room temperature and atmospheric pressure would heat itself to  $4030^\circ\text{K}$  and the degree of dissociation would then be 0.642.**

There is another factor which tends greatly to increase the temperature of the atomic hydrogen flame even above the calculated value of  $4030^\circ\text{K}$ . The atomic hydrogen, instead of being originally at room temperature, is already at a high temperature at the moment of its escape from the arc. The conditions are analogous to those in an oxyhydrogen flame in which both gases are preheated. **Thus the upper limit of temperature is fixed only by the degree of dissociation of the hydrogen and the rate at which heat is lost by radiation or contact with bodies of lower temperature.**

#### **Rate of Surface Heating by Flames**

Although the high temperature of the atomic hydrogen flame is of great importance when it is desired to melt substances of very high melting point such as tungsten, a factor of even greater importance in for example in ordinary welding operations is the speed with which heat can be delivered to a surface per unit area.

If a Bunsen burner flame delivers 51 watts per sq. cm to the whole surface of a black body, it would thus heat it to a maximum temperature of  $1730^\circ\text{K}$ . If heat is applied by the flame to one side of a plate-shaped body and the heat is radiated from both sides, the maximum temperature reached would be  $1450^\circ\text{K}$ . The fact that

the Bunsen flame does not heat bodies so hot as this indicates that the rate of surface heating decreases as the temperature of the body increases. The heat reaches the surface from such a flame by conduction through a relatively stationary film of gas. The decrease in the temperature gradient when the body becomes hot would explain the lower rate of surface heating. With 1330 watts per sq. cm delivered by the atomic hydrogen flame, the temperature of a black body would rise to  $3900^\circ\text{K}$ . The power radiated from tungsten at its melting point is 395 watts per sq. cm, and 1330 watts per sq. cm should heat tungsten to about  $5300^\circ\text{K}$ .

At such high temperatures, however, the rate of surface heating by an atomic hydrogen flame must decrease because of the fact that the hydrogen remains partly dissociated so that the recombination is not complete. With surface temperatures below  $2000^\circ\text{K}$ , however, this factor would be negligible. It is probable that the rate of surface heating would be dependent not so much on the temperature gradient in the surface film of gas as on the rate of diffusion of atomic hydrogen through this film. Thus we may expect the rate of delivery of energy to a metal surface to remain nearly constant until the surface reaches a temperature of at least  $2000^\circ\text{K}$ .

#### **Total Heat Delivered to Surfaces**

It now became of interest to determine what fraction of the total energy in an arc or a flame could be delivered to a large flat surface against which the flame was directed. For this purpose a cylinder of copper 10.5 cm in diameter and 9.8 cm long was used, which weighed 7950 grams. The flame was directed against one of the flat polished ends, and the rate of temperature rise was measured. A 60-ampere AC arc using a torch like that shown on the Fig. 2 produced an atomic hydrogen flame.

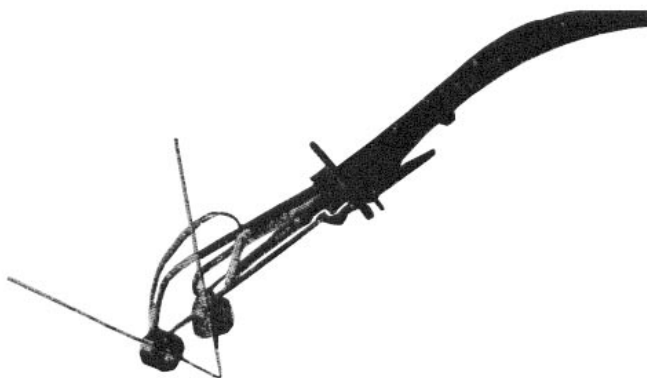


Fig. 2. Atomic Hydrogen Torch

The voltage across the electrodes was 70 volts. A wattmeter showed that the power consumption in the arc was 3510 watts, which gives a power factor of 0.84. The electrodes were tungsten rods 3.2 mm in diameter which made an angle of 55 degrees with one another. The rate of flow of hydrogen which bathed the electrodes was 14.2 liters per minute (30 cubic feet per hour). From the temperature rise of the copper block

the heat delivered to the surface was found to correspond to 3100 watts when the electrode tips were 3 to 5 mm from the copper surface. This decreased to 2800 watts at 13 mm, 2500Wt at 25 mm, and 2200Wt at 35 mm. With the arc turned off but the molecular hydrogen burning in the air, the rate of heating corresponded to 250 watts with the electrodes 6 mm from the surface. Subtracting this energy delivered by the combustion of the hydrogen in the air, we find that the energy carried to the metal by the atomic hydrogen ranged from 2850 to 1950 watts. Thus with the electrodes 3 mm from the metal 82 per cent of the power input into the arc was delivered to the copper surface. This efficiency became 78 per cent at 6 mm, 71 at 13 mm, 65 at 25 mm, and 55 per cent at 35 mm. The power corresponding to the complete combustion of 14.2 liters of hydrogen per minute is 2360 watts. Actually, only 250 watts or 11 per cent of this reaches the copper. The total energy of the arc and the flame of molecular hydrogen is 5870 watts, of which 3100 watts or 53 per cent is delivered to the copper.

An oxy-acetylene flame from a standard welding torch consuming 30.6 liters of oxygen per minute (64.8 cubic feet per hour) and 28.6 liters of acetylene per minute (60.6 cubic feet per hour) delivered energy at the rate of 4400 watts to the copper surface. A smaller torch consuming 13.7 liters of oxygen per minute and 13.0 of acetylene (29.0 and 27.5 cubic feet per hour, respectively) gave energy to the copper at the rate of 3900 watts.

#### **Application of Atomic Hydrogen Flames to Welding of Metals**

The high temperature of The Atomic Hydrogen flame, together with its powerful chemical reducing action and the avoidance of gases containing oxygen and nitrogen, render it particularly useful for welding, not only for iron and its alloys, but for such metals and alloys as contain aluminum, magnesium, chromium, manganese, etc.

Fig. 2. illustrates one of the later forms of torch used for welding. Two tungsten rods, as electrodes, are held at a definite angle to one another by easily adjustable clamps, and a jet of hydrogen is directed from a small nozzle along each of these rods near its end. The hydrogen thus bathes the heated parts of the electrodes and forms a gentle blast of gas which passes through the arc between the electrode tips, and blows the atomic hydrogen away from the electrodes so that these are not unduly heated. Other torches were also built suitable for automatic welding using machine feed. The electrodes were ordinarily separated 3 or 4 mm and the arc assumed a fan shape extending 6 to 10 mm from the electrodes. Alternating current was generally used.

To utilize the atomic hydrogen flame for the welding of metals it became important to have easy and complete control of the flame. Many different forms of welding torches were constructed and tested. The electrodes between which the arc passed were mounted at a

convenient angle to one another and were adjustable so that they could be brought into contact at a point which was exposed to a blast of hydrogen from one or more orifices. Thus the atomic hydrogen was blown out of the arc in a definite direction and formed a flame which could be brought into contact with the metal to be welded. The jet of hydrogen also served to bathe all the heated parts of the electrodes and the work, thus preventing oxidation and the introduction of impurities such as nitrogen into the weld.

Hydrogen was supplied by a tube which passed through the handle and then by flexible tubes was delivered to each of the electrode holders and escaped through the annular spaces between the electrodes and the lava insulators. Sufficient hydrogen was used not only to surround each of the electrodes to their tips but to form a blast which blew the atomic hydrogen against the work and bathed it in hydrogen.

#### **Electrical Apparatus**

Both the striking voltage and the arc voltage were higher for an arc in hydrogen than for the ordinary welding arc since there was no appreciable amount of metallic vapor generated in the arc. The standard arc welding equipment of those days was therefore not suitable as a power source for operating the atomic hydrogen torch. If direct current was used the arc could be stabilized by a series resistance or a specially designed generator of the constant-current type could also be used. With series resistance a line voltage of 250 was found to give good results.

Alternating current was more convenient and, since the arc could then be stabilized by reactance instead of resistance, greater efficiency was usually obtained. A line voltage of 350 to 400 gave satisfactory operation. Voltages as high as this were needed solely to give stability and to enable the arc to be started at any time by separating the electrodes even when these were cold.

A number of tests were made to determine the voltages required to strike an arc by means of the lever mechanism of the torch. With cold electrodes an open circuit ac voltage of 320 was needed for striking the arc. After the arc had been started and the electrode tips had reached the operating temperature a line voltage of only 150 was sufficient to restart the arc as long as the electrodes remained nearly at the operating temperature. These lower voltages could also be employed to start and maintain the arc if the electrodes were first raised to high temperature by a high current while separating them very slightly so as to have a high contact resistance or by bringing a thin tungsten rod between the separated tips of the electrodes.

It was more convenient, however, to use open circuit voltages of approximately 400V rather than to employ these special means of starting the arcs. In normal operation the drop across the arc was in the neighborhood of 80 volts. To avoid danger to the operator

the entire arc circuit was preferably insulated from ground. A motor-generator was used to give either direct or alternating current for the arc, but it was usually more satisfactory to use a specially designed transformer.

Connections that were used in most of the work to be described are shown on the Fig. 3. When the arc was not operating the electrodes were in contact by the action of the spring attached to the control lever, so that there were no voltages on the electrodes and the torch could be laid down on any material without danger of flashing the operator's eyes. To strike the arc the electrodes were merely separated by pressing the lever.

Should the open-circuit voltage at any time be impressed across the electrodes when separated, or the operator break the arc by spreading the electrodes too far apart, a relay in the arc circuit (contactor *B* as shown on the Fig.3) would trip the feeder circuit, in which case it was necessary for the electrodes to be brought in contact again before the main feeder circuit could be restored.

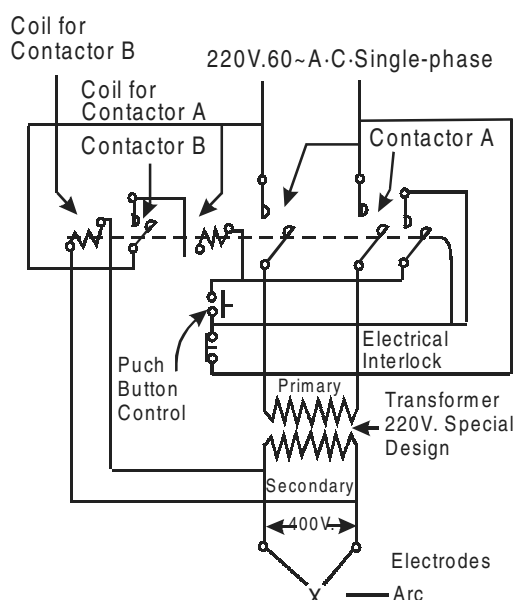


Fig.3. Circuit diagram of apparatus used with atomic hydrogen welding torch.

The voltage drop across the arc while in operation varied from 60 to 100 volts, depending on the amount of opening between the electrode tips. This voltage was nearly independent of the current, between the limits of 20A and 70 A, although a slight decrease in voltage was usually noted when the current was increased. Repeated experiments showed that the lower voltage arc (60 to 80 volts) obtained by separating the electrodes only at  $\frac{1}{16}$  or  $\frac{1}{8}$  inch had a more concentrated working zone and was the most efficient arc for most kinds of welding.

By bringing the arc closer to the surface of a larger mass of metal it was found that the metal melted very rapidly. For welding, the maximum rate of heating was desired

and this was obtained by bringing the torch so close to the metal that the lower portion of the fan shaped arc was just about in contact with the metal and this caused the arc to change its shape somewhat.

The tips of the electrodes were then usually about  $\frac{3}{8}$  to  $\frac{1}{2}$  inch from the metal. Portions of the arc could at times become shortcircuited by the metal so that the tracks of cathode spots on the metal could be seen, but this seemed to play no important part in the welding process.

## Conclusions

The above is a general account of the course of events that led to the development of the atomic hydrogen arc welding technique. Although Langmuir himself had many ideas for other applications of atomic hydrogen, such as using it in melting furnaces, and although General Electric themselves were aware of the vast potential of atomic hydrogen (as expressed by the editor of the General Electric Research Laboratory Publication "...The point of inception of many important practical processes can be found in researches in pure science. Following Dr. Langmuir's discovery of atomic hydrogen, conclusion was reached that flames of this gas make possible new applications of far-reaching importance"), no subsequent effort was made to develop neither the welding method nor any other application using atomic hydrogen.

In spite of the obvious value of the process, industry's excuse for laying the process aside was that it had been 'replaced' by 'better' processes such as Heliarc, TIG, and MIG welding, though *plasma arc welding* is rarely mentioned which has also almost disappeared from the market. Since plasma arc welding is merely an extension of the atomic hydrogen process, the reasons are undoubtedly the same.

As a welding process, atomic hydrogen arc welding was "obsolesced" by MIG and TIG neither of which compare to its welding efficiency and uses. Considering that atomic hydrogen arc welding hardly got off the ground before it was replaced, it is not a far fetched thought to assume that the interests of welding suppliers and electric power companies were being nursed so that more archaic tanks, transformers, gauges, torches, electrodes, gases, fluxes, power etc. could continue to be sold at profit.

The reader is reminded of the fact that Langmuir's experiments and findings were taking place almost 100 years ago. Since then, technology has progressed dramatically in many fields. If Langmuir had at his disposal the knowhow and technology of today, our world may have looked different.

However, we are now in the fortunate situation that we do possess the data of Langmuir's findings, which can be combined with today's technological knowhow. The obvious direction in which to look is the same direction that seems to have been the fundamental

reason for Langmuir's discoveries having been swept under the carpet: CLEAN AND ABUNDANT ENERGY.

If anyone looks up to find any information on atomic hydrogen arc welding, only a few lines will appear, simply informing that "the arc is maintained between two metal electrodes in an atmosphere of hydrogen. Shielding is obtained from the hydrogen. Pressure and/or filler metal may or may not be used. Although the process has limited industrial use today, atomic hydrogen welding is used to weld hard-to-weld metals, such as chrome, nickel, molybdenum steels, Inconel, Monel and stainless steel. Its main application is tool and die repair welding and for the manufacture of steel alloy chains. Also used in special military welding requirements."

**Nothing is mentioned of the extraordinary properties of atomic hydrogen, nor of its potential for the use as energy to drive the wheels of mankind.** However, and quite surprisingly, in one edition of Van Nostrand's Encyclopedia of Science it was stated "*Hydrogen molecules dissociate to atoms endothermically at high temperatures (heat of dissociation about 103 cal/gram mole) in an electric arc, or by irradiation*" ...."*the hydrogen atoms recombine at the metal surface to provide heat required for welding.*" What is surprising here is that the actual energy value needed for the dissociation of the hydrogen molecule is given, but the calorific value for the recombination of the atoms into molecules is strangely omitted.

From Langmuir's experiments and findings we know that the minimum calorific value for the recombination of atoms was agreed to be in the region 90.000 cal/gram molecule. In other words we have an input energy that 103 cal/gram molecule and an output energy of 90.000 cal/gram molecule. In conventional science this seems to be violating the law of conservation of energy. Langmuir explained this (however, not very convincingly) by the heat being carried forward from the arc to the metal surface. One area which certainly deserves the attention of modern science, is the replication of Langmuir's experiments using high-tech measurement equipment.

During the 1920s there was a general scientific consensus in the community of theoretical physics, that the space between the nucleus of the atom and its orbiting particles, was empty space, vacuum. It was not before the late 1950s that the existence of Zero Point Energy was discovered by the Dutch physicist M. J. Sparnaay. He continued the experiments carried out by Hendrick B. G. Casimir in 1948 which showed the existence of a force between two uncharged plates that arose from electromagnetic energy surrounding the plates in a vacuum.

Mr. Sparnaay discovered that the forces acting on the plates arose from not only thermal energy (heat) but also from another type of radiation now known as classical Zero Point Energy. Mr. Sparnaay determined

that not only did the zero point electromagnetic energy exist in a vacuum but also that it persisted even at a temperature of absolute zero. The term Zero Point Energy (ZPE) has been based on the concept that even if matter were cooled down to absolute zero (minus 273°C), in terms of its temperature, the energy field still remains.

Because it exists in a vacuum, ZPE is homogeneous (uniform) and isotropic (identical in all directions) as well as ubiquitous (exists everywhere). In addition, the intensity of the energy at any frequency is proportional to the cube of that frequency. Consequently, the intensity of the energy field increases without limit as the frequency increases resulting in an infinite energy density for the radiation spectrum. With the introduction of the ZPE into the classical electron theory, a vacuum at a temperature of absolute zero is no longer considered empty of all electromagnetic fields. **Instead, the vacuum is now considered as filled with randomly fluctuating fields having the ZPE spectrum.**

The special characteristics of ZPE are, as mentioned above, that it has a virtually infinite energy density and that it is ubiquitous (even present in outer space), which makes it very desirable as an energy source. However, because high energy densities exist at very high frequencies, and because conventional methods are only able to convert or extract energy efficiently at lower frequencies, effectively tapping this energy source has been unavailable using conventional techniques....*Until now!*

Had Langmuir been familiar with ZPE, he would most certainly have reached other conclusions in terms of explaining the extraordinary energy properties of atomic hydrogen. As it was proven by Langmuir, the volume of the hydrogen when dissociated into atoms increases to the double of the volume of its molecular state. Upon recombination, heat energy is released to the tune of 90.000 cal/gram molecule. When incorporating ZPE in the explanation of the hydrogen process, it could be argued **that the hydrogen is not really a fuel but rather a medium, gateway or a super-conductor of ZPE from the vacuum of space, converting ZPE radiation and ultra-high frequency electrical energy into infrared (heat) radiation.** On recombination into molecules the ZPE is "squeezed" out, releasing the absorbed energy.

Actually since heat is infra-red spectrum radiation, the process can be conceived as a means of converting ZPE from an ultra-penetrating cold spectrum radiation, to a mass-reactive infra-red heat spectrum radiation, and that is the proximate source of so called FREE ENERGY, in the form of exothermic heat radiation. ZPE can be analogized to a concentrate of sunshine, except it penetrates all matter all the time and is not affected by day or night, so it can be converted into usable energy at all times with the appropriate technology, such as the atomic hydrogen process. The apparent source of the anomalous exothermic heat produced in "Cold Fusion" is also based on atomic hydrogen.



# ATOMIC HYDROGEN FURNACE

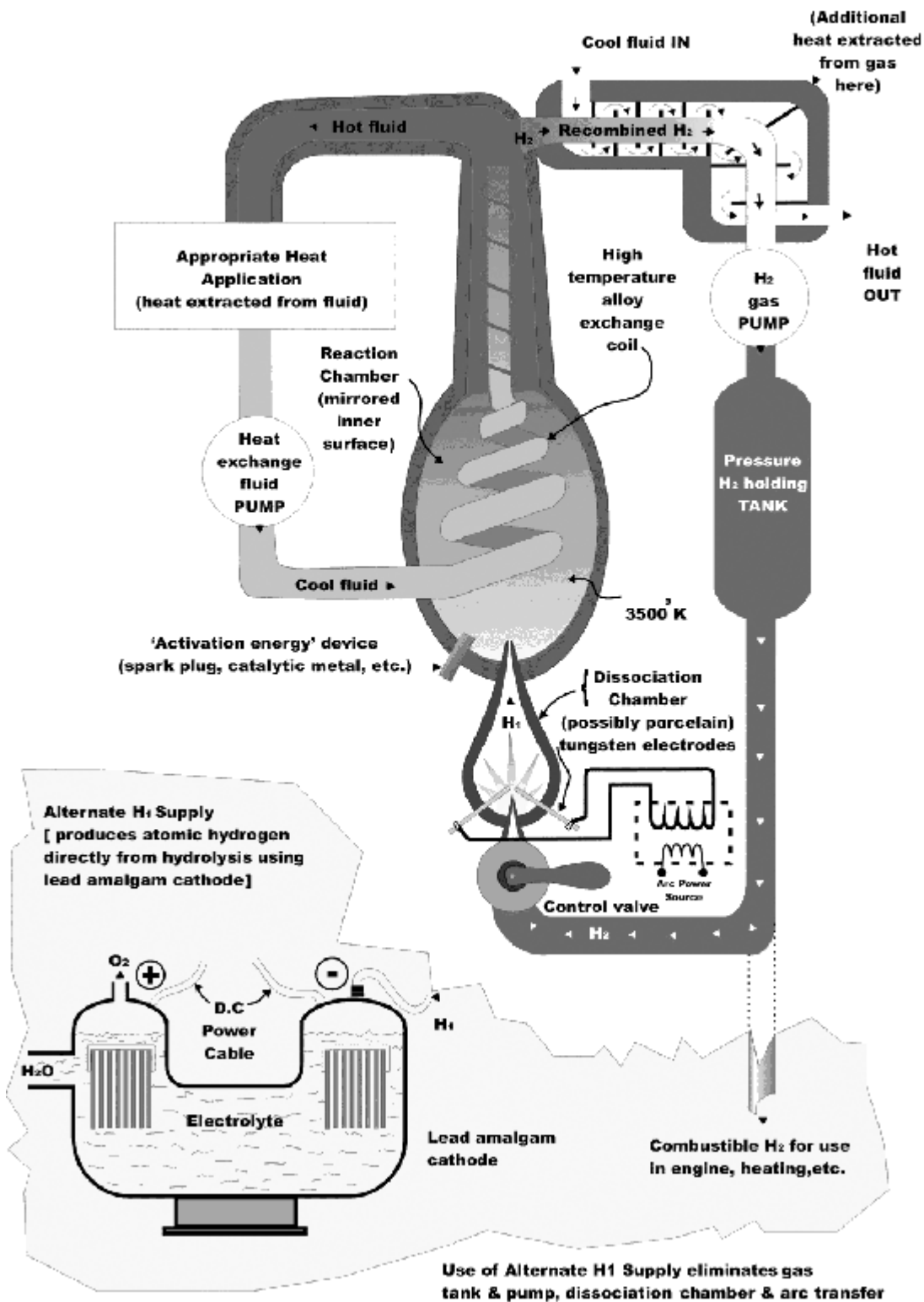


Fig.4

**It is important to note that the hydrogen process does not involve a consumption of the hydrogen as it is not combusted in the process.** It is merely dissociated and recombined and can therefore be recycled over and over again without consuming more hydrogen than the quantity used to start with.

So how do we move forward and develop a feasible technology that harnesses this abundant and clean source of energy? The answer is simple. Take Langmuirs work, dust it of a bit and upgrade it by applying modern technology and knowhow. The basic design in Fig. 4. should serve as a source of inspiration for researchers to accept the challenge and pour their attention in that direction.

Today we have extensive knowledge of materials, heat-exchangers and direct heat converters producing electricity from heat without any movable parts by using photo-voltaic technology. Even an atomic hydrogen torch is now available in the market (see Fig.5.), that could eliminate the use and consumption of Tungsten which unfortunately is becoming a relatively scarce commodity and therefore increasingly expensive.



Fig.5

**This Atomic Hydrogen source works by thermally dissociating hydrogen in an electron bombardment heated tungsten capillary and was developed for the following applications:**

- Damage free in situ cleaning e.g GaAs, InP, Ge and Si. Removal of residual oxygen and carbon.
- Low temperature cleaning
- Surfactant - improvement of layer properties during growth
- Post growth surface treatment/improvement
- Chemical passivation and surface reconstruction
- Annealing of amorphous silicon

However, modifying this torch to serve an Atomic Hydrogen Energy Generator should not represent a big problem. Langmuirs method of dissociating hydrogen could also be improved considerably by bringing down the expenditure of electric power and by increasing the degree of dissociation as well as the degree of recombination at the catalytic metal surface.

Relative simple and inexpensive research will do the job in a very short period of time. The investment of time, work and funds is so negligible in comparison to the potentially gigantic rewards, that it should appear very difficult for any researcher in any relevant field to find a viable excuse for remaining inactive in this respect.

Below is a comparison of values for commercial fuels in MJ/kg (megajoules/kilogram):

	Gross	Net
Hydrogen	141.9	120.0
Carbon to Carbon monoxide	10.2	-
Carbon to Carbon dioxide	32.8	-
Sulfur to Sulfur dioxide	9.16	-
Natural Gas	53.1	48.0
Liquefied petroleum gas	49.8	46.1
Aviation gasoline	46.0	44.0
Automotive gasoline	45.8	43.8
Kerosene	46.3	43.3
Diesel	45.3	42.5

The value at the top of the list is for **molecular** hydrogen as opposed to the value of **atomic** hydrogen which is over ten times higher.

The value at the top of the list is for **molecular** hydrogen which does not even come anywhere close to the energy value of **atomic** hydrogen. These figures alone, should be enough to attract both funding and brainpower to research. Due to the connotations that the word "atomic" has in everyday language, the reader is reminded that the term "Atomic Hydrogen" does not in any way imply the existence of nuclear radioactivity. The term is used solely to distinguish between molecular and atomic hydrogen. The Atomic Hydrogen Process is 100% CLEAN and SAFE.

***When you add the fact that the hydrogen is not consumed in the "burning" process, and can thus be recycled, it should become very clear to any scientist, humanist, environmentalist, business executive and indeed to every human being that is concerned about the state of our wonderful planet, that no more time should be wasted.***

The time has come for removing the responsibility of defining the energy policies and structures of the future from the hands of the established energy industries, and place it in the hands of men of science who will work for the preservation of the environment that sustains all life on Earth. Men who will work for the economic development of the third world by means of providing clean, abundant and inexpensive energy technologies.

Such initiative will only succeed when massively supported by the visionary captains of industry who will have the courage to dismantle the existing and

scandalous energy grid which now envelopes our planet, by investing in the production and marketing of small energy generators for individual households, factories, transport etc.

Once such a generator has been acquired by the consumer, his further energy requirements will be covered for *FREE*, giving him independence in terms of

energy as well as increased buying power any other economic development.

However, before industry will move, Science and the Individual in society must join hands and raise a highly visible flag, proclaiming the desirability and the feasibility of such technologies.

Nicholas Moller, August 2001.

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## Scalar Wars The Brave New World of Scalar Electromagnetics

Bill Morgan

*"Electric power is everywhere present in unlimited quantities and can drive the world's machinery without the need of coal, oil, gas, or any other of the common fuels." Nikola Tesla*

*"At any point and at any time, one can freely and inexpensively extract enormous EM energy flows directly from the active vacuum itself." Tom Bearden*

(Published in short by Alexander V. Frolov's edition)

***Editor's note: In this very interesting article you can find important Bearden's idea on scalar electromagnetism and its relation with MEG (motionless electromagnetic generator). I removed from original text most of text about weaponization of this technology.***

For the past six months I have been undergoing the greatest **paradigm shift** I have ever had to go through. It has rattled my nerves and shaken my bones. This intense adjustment of my "world" has come about by studying the information given by Col. Tom Bearden at his website Cheniere. The new knowledge there has necessitated a total revision of my ideas about physical reality, the world we live in, and the future of humanity. This paradigm shifting even actually made me dizzy on certain days as I tried to absorb and digest Bearden's vast amount of information. I am not a scientist at all, just a layman, and I have little comprehension of the math and high physics of this new science called "**Scalar Electromagnetics**." But there is a great deal of information at Cheniere which needs to become common knowledge as fast as possible, for the sake of the survival of life on earth. To that end I have put together this small primer of Bearden's ideas, as a kind of "beginner's guide" to his website. (I have tried to underline certain words and phrases which are part of the new "jargon" of talking about these "new" phenomena. Also I have taken the liberty of holding certain words and phrases to help them stick in the mind).

(Note: Throughout "**EM**" means "**electromagnetic**," and "**LW**" means "**longitudinal wave**")

### 1. New waves discovered

Longitudinal EM energy fills vacuum of space, the time domain of spacetime, time as compressed energy,  $E=tc^2$ , waves of time, phase conjugate wave pairs.

### Some Immediate Implications

The implications of successful engineering of the longitudinal waves are enormous, and will change the world as we know it, one way or another. Among other things, these discoveries mean that:

1. The **solutions to the energy crisis and the "oil problem" are in hand**. These oil wars are unnecessary. There is endless energy available freely from the domain of time.
2. **Unbelievably powerful weapons** are not only possible, but are already operating in several nations. The many powers of these weapons are unprecedented and mind-boggling.
3. The cure of diseases such as cancer and AIDS, in fact nearly any disease, has become possible within a few years of sufficient funding. Everyone can be made healthy and stay healthy.
4. **Mind control on a mass scale** has now become possible, and the machines to do it are already in place in certain nations. It has become possible to mentally enslave whole populations with the twist of a few dials. **So the layman will need to understand that there is a new kind of electromagnetic energy that is altogether different from what he knows, e.g. radio, TV, cell phones, etc. The ordinary EM waves that we have known about are called transverse EM waves, to distinguish them from the new longitudinal EM waves. These scalar waves do not actually exist in our "material" world, but exist only in the vacuum of empty space, or the time domain. And we must keep in mind that this vacuum of space we speak of exists all through everything. Even our bodies are mostly empty space between atoms and molecules. So the gateway to this seething ocean of energy can be there at every point in the universe. This seething ocean of energy is all around us and all through us.**

# Hydrogen Energy

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*Editorial: in this work Studennikov and Kudymov develop the problem of hydrogen energy. Their electrical hydrogen generator (EHG) is realized as a prototype of 150 KWt heat power. The authors create an artificial gravitational field by means of rotation. With this they produce cheap hydrogen and electric input is very small. Really, we believe that the authors are modest, because effectiveness of their system is more than 100%. The excessive power produced by their generator is compensated by environmental heat.*

## Letter to editor

Dear Alexander Frolov!

Thank you for your complimentary estimation of our modest work. You are right we should have more publications. Let's publish our work. Lenin sometimes gave wise thoughts such as "Idea that got the control over people masses, is a material force".

Situation with hydrogen energy in Russia is very inauspicious. To make sure that it is right, let's try to brows for "hydrogen energy" in Alta Vista Internet search system. As a result you will find thousands of websites devoted to this problem. In Russia this problem is worked out only by Kurtchatovsky Institute and our Institute. Energy Department of USA spends 200 millions dollars annually to finance R&D work on this problem. We do all this work on our enthusiasm only. The most interesting fact that now we are in the vanguard of this research. Of course, we are not able to keep our positions for a long time. In this case a critical situation can appear in Russian economy, because it is based on the export of energy resources.

With regard,  
Studennikov V.V.

## Introduction

It became absolutely evident in the last decade that the further intensive development of modern energetics and transport lead humanity to the large-scale ecological crisis. A rapid reduction of fossil fuel resources on a background of natural annual growth of energy consumption constrains industrially developed countries to extend the system of atomic energy installations. These installations increase the damage of their exploitation in a higher extent. The problem of recycling of radioactive wastes is sharply increasing.

Taking into account this alarming situation, many scientists and experts support the more rapid search of alternative non-traditional energy sources and application of new energy resources in energetics and transport. In particular, they draw attention to hydrogen. Resources of hydrogen in the waters of World Ocean are inexhaustible. Besides, the indisputable advantages of this fuel are the comparative environmental safety of usage, acceptability for heat-engines without any considerable changes in their design, high calorie content, possibility of long-term storage, transportation by existing transport network, non-toxicity, etc. However, the essential problem to get over up to the present day is the problem of diseconomy of its production. More than 600 firms, companies, concerns, university laboratories and social scientific and technical organizations of Western Europe, USA, Australia, Canada and Japan are working hardly to make hydrogen cheaper (see the magazine "Avtomobilny Transport" / "Motor Transport", #4, 1992, p. 38). Successful solution of this problem will revolutionary change all world economy and will improve our environment.

## Description

There are numerous known ways to decompose water. They are chemical, thermochemical, electrolysis and others, but all of them have one big shortcoming. A very expensive and high-grade energy is used in the technological process of hydrogen production. In its turn, to produce this energy we should spend the unprofitable fossil fuel (coal, natural gas, oil products) or electrical energy produced on electric power stations. Suffice it to say that during the traditional electrolysis in industrial conditions the electrical energy consumption to produce one cubic meter of hydrogen constitutes 18-21 MJ and total energy consumption (taking into account the production of electrical energy itself) exceeds 50 MJ. It makes hydrogen to be very expensive (about 2\$/m<sup>3</sup>).

At the same time, our planet literally bathes in the flow of heat energy, produced by the Sun, earth bowels and human activity. The problem is only to introduce this inexhaustible source of free low-grade heat to the industrial technology of hydrogen production. Now the hypothesis is developed and its theoretical scientific validation is given. According to this hypothesis there is a principal possibility to transform the heat of any origin directly to the potential chemical energy by means of water decomposition into hydrogen and oxygen in the solution of electrolyte placed in the strong artificial inertial field. ***Thereby, we can replace the traditional energy in the common energy balance of electrochemical process of water decomposition to the heat of external source and mechanical energy of inertial field.*** This natural physical and chemical phenomenon got the name of ***gravitational electrolysis***. An efficient device, electrical hydrogen generator (EHG) was designed and patented according to RST system (international application RU98/00190 of 07.10.97) to provide this electrolysis.

**It is operated by mechanical drive and works with a common temperature in the mode of heat pump.** This device absorbs the necessary heat from the environment through its heat exchanger or utilizes the heat wastes of industrial or transport energy installations. In the process of water decomposition the excessive energy applied to the drive of EHG can be transformed into electric energy on 80%. This energy then can be used in external active load. During this process from 20 to 88 energy units of low-grade heat are absorbed for every unit of consumed power. It depends on the given operation mode. This process compensates the negative thermal effect of water decomposition as a chemical reaction. In the generator of one cubic meter of operation volume (for the optimal mode with efficiency of 86-98%) we can produce 3,5 m<sup>3</sup> of hydrogen per second together with about 2,2 MJ of direct electric current. Unit heat power of EHG can vary from few tens Watt up to 1000 MWatt dependently of the technical task. Designed specific energy consumption to produce gaseous hydrogen constitutes 14,42 MJ/ m<sup>3</sup>. Since we use only free heat in this process, the cost of production of 1 cubic meter of hydrogen decreases up to 0,0038\$ and becomes 2,5-3 times cheaper than the total cost of production and transportation of equivalent volume of natural gas.

The wide range of control and nonordinary specific performance of this process allows applying the invention in big and small energetics with a guaranteed success. The application is possible in various kinds of transport, in agriculture, in municipal economy, in chemical, cement, pulp and paper, refrigeration, atomic and space industries, non-ferrous and ferrous metallurgy, for the water desalination, welding fabrication, etc.

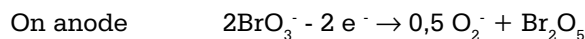
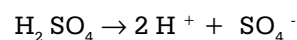
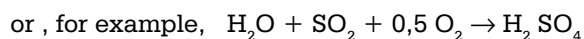
Physical essence of the operating process of EHG is very simple and it is a logical development of the known physical experiments by Tolmen and Stewart made in 1916. It is known that electrolyte dissociate in ions, which are hydrated by molecules of water, during its solution. As a result, hydrated shells of different density are formed around them. Energy of interaction of hydrated unlike ions with each other sharply decreases and becomes closer to the energy of Brownian motion of water molecules (with 18°C  $Wk = 3/2 KT = 6 \cdot 10^{-21} J$ , where K is Boltzmann constant, T is an absolute temperature). If we place the concentrated solution of dissociated electrolyte having a significant difference of anion and cation masses to the strong artificial gravitational (inertial) field (for example, to rotate it into the EHG reservoir) and the effective rate of rotation for various electrolytes and parameters of the device is 1500-45000 rpm, then ions will begin partly separating.

Heavy ions influence each other with their electrical field and they will move to the periphery of the reservoir. With this their kinetic energy will be close to the energy of heat movement. For example, for the ion BrO<sub>3</sub><sup>-</sup> having the mass of  $m = 21,26 \cdot 10^{-26} kg$  and with the peripheral velocity  $V = 330 m/s$  (the inner diameter of the reservoir is 0,14 m, rate of rotation is 45000 rpm), kinetic energy will constitute  $W = 0,5mv^2 = 11,57 \cdot 10^{-21} J$ . The extreme

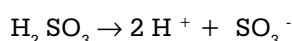
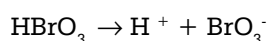
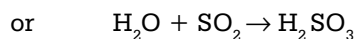
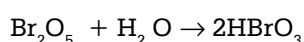
ions will press to the inner surface and will create the spatial concentrated electrical potential. **With this the resulting centrifugal force acting on ions pressed to anode (anions) will destroy their hydrate shells as the weakest ones.** The light ions are less responsive to gravitation and they surrounded with more strong shells. That's why they cannot give their molecules of water to the heavy ions. Due to these circumstances they will concentrate above the heavy ions and in the area of rotation axis (near cathode) forming the electrical potential of the opposite sign. Free electrons in anode will move to cathode under the action of spatial (volumetric) anion charge (it is a known property of Faraday cage). For some minimal (threshold) rate of rotation with given electrolyte, i.e. for some critical value of electrical potentials on electrodes, the balance of charges will be broken. Electrons will leave cathode and will ionize the molecules of hydrated shells, and these shells will pass charges to cations. **In other words, the electric disruption of this electrolytic condenser will take place and discharge of ions will begin. During this process free hydrogen will form on cathode and oxygen and anodic gases (deposit) will form on anode.**

Thus, due to the action of natural principle of energy reversibility, gravitational field will create an electrical field energetically adequate to it, which will overcome the energy of aquation and will provide an electrolysis. This process goes with the absorption of heat through the heat exchanger and it requires a constant dilution with water to get the initial concentration of the solution. Its principal energy scheme in many respects is similar to the scheme of traditional electrolysis, but in this scheme the external expensive electric current is not necessary. The environmental heat or other sources is used here.

Some formulas:



In the near-anodic space the reaction of deposit with hydration water





Here we should note four very essential features of gravitational electrolysis.

First, the work of mechanical inertial field, which is spent to the precipitation of water molecules, light and particular heavy ions, is almost fully returned to the system. It is a kinetic energy of hydrogen, oxygen and anodic gases floating to the axis, because their density is smaller than the density of solution. As a result, the sum of angular momentum of initial and final products of electrolysis becomes close to zero, i.e. mechanical work of EHG drive is consumed mainly against frictional force. The anodic deposit and floated gases react again with water and oxygen to form the initial composition of the solution.

Secondly, intensive self-cooling of the solution provides the condition for the absorption of heat from environment or other sources to compensate the endothermic effect of decomposition reaction of water, i.e. the work in the mode of high-efficiency heat pump. Flora of the Earth have been used heat for hundreds millions years to decompose water and carbonic acid gas for built-up of hydrocarbon biomass. It is known from practice that this process goes in the conditions of full darkness, for example, in old mines, caves, cellars of houses or metro tunnels. Therefore, the spontaneous thermochemical process of transition or transformation of heat to the potential chemical energy is principally possible in nature. The second law of thermodynamics proves this fact and point out the increase of entropy of the system.

Thirdly, it is able to produce direct electrical current on the external load in the case, if the rotation frequency of the reservoir is more than minimal necessary (threshold) one. Then EHG shows the properties of electric generator with voltage-current characteristic of condenser type (voltage on the clamps is in direct proportion to the external load).

Fourthly, EHG simultaneously is an electrical generator of direct current and electrolyzer.

And at last, the use of free heat of environment, heat waists of industrial, energy systems or transport in the process of hydrogen production sharply decrease production cost of this gas. All this features provide incomparable higher efficiency of the gravitational electrolysis, and therefore, higher economy.

### **Application**

The electric hydrogen generator is simple in construction and matches the assembling of various powered propulsion systems of transport, for example, automobile, bus, agricultural implement, diesel locomotive or tractor. It is good in unitizing with all these systems, with heat turbines in particular. Along with the solution of main technical and economic problem, a precondition to create the principally new, more perfect transport in near future is formed. It will be a mass

electric vehicle with big fuel distance, working on the heat-mechanic source of current.

Application of EHG as a utilizer of heat on numerous compressor plants of gas-main pipelines will allow 2-2,5 time increasing of fuel efficiency of turbounits due to the utilization of their heat waists and heat emitting during compression of natural gas to produce hydrogen, which can fill up the consumption of hydrocarbon fuel in 60% and thus provide its tangible saving, i.e. to increase the sales volume without increase of production.

The idea to cool the cargo natural gas up to the minus temperature seems to be promising. It will allow applying the elevator (gas-static) principle of creation of additional excessive pressure in the gas-main (approximately in 6-8%) as well as to increase the throughput capacity and lifetime of the pipeline. Heat extracted from natural gas can be transformed and used to the needs of economic organizations, which are situated along the trace of gas pipeline...

Energy advantages of this method are evident, especially in the mountain conditions of gas pipeline laying. Equipment of drivers of road-building techniques and various self-propelled machines with EHG will 1,7-2 times decrease the consumption of diesel or gaseous fuel. It will entail the decrease of cost of construction work.

Conversion of railway transport to systems with EHG application promises a sharp decrease of exploitation costs on the technical service of electric mains and considerable saving of electric power.

EHG on the sea crafts and riverboats can use the heat of outboard water and it will give a chance to change the atomic energy installation. It will allow increasing the efficient tonnage and ecological safety of vessel exploitation with an actual unlimited autonomy of navigation. Together with this, instead of traditional screw we can use the direct transformation of chemical energy of burnt hydrogen and oxygen to the mechanical kinetic energy of the uniflow water-jet propellers. It will simplify the design of propulsion engine of the vessel. Floating mobile electrogas generator stations can provide big coastal settlements, industrial or agricultural objects with free heat and electrical power. Design value of production of 1 MJ of heat in Russia will constitute 0,00027-0,0004 \$ and production of electrical power will be 0,0008 - 0,0011 \$.

EHG can be applied for aircraft also. In this case heat exchangers additionally should include the onboard condenser of water steam of auxiliary gas turbo-prop engine, which works on pure hydrogen-oxygen mix. It will give a chance to multiple usage of minimal recycle water in the closed circle as well as to adequately provide the vehicle with electric power. Such design will entail the decrease of the flight weight due to decrease of fuel storage, and therefore, will increase the load capacity of aircraft.

EHG on the space stations can replace gyroscopes and traditional solar batteries as well as provide the space jet engines with effective, much more cheaper and safe fuel.

Utilization of excessive heat in coalmines liquidates a sharp problem of coal mining safety. Underground burning of coal remains in unpromising mines and using of the received heat to produce hydrogen fuel and electric power will decide social problems of coal-mining regions.

Various modifications of power range of EHG can be applied in small stationary and mobile energetics, particularly in the field of energy supply of remote settlements, military and industrial objects, expeditions, farms, drying machines, greenhouses, etc. In the last case the perennial gross production of crop production in the regions of cold climate will be possible. The energy source for EHG can be the heat of any reservoirs, industrial and household drains, heat from rubbish burning and organic wastes, inner or outer air (for example, from metro, mines, residential and public constructions), various industrial vapor and gases including those from metallurgy, chemistry and heat-and-power engineering, compost pits in agriculture as well as solar, wind and geothermal energy.

Application of this invention on the acting heat and nuclear power plants will substantially increase their profitability due to the effective use of heat losses.

There is a real possibility of conversion of heat power plants to use hydrogen as a fuel. This hydrogen is produced from the transformation of heat of nearby water reservoirs. In this case the cost of electric power production will 1,5 times decrease. In ferrous metallurgy hydrogen will replace the expensive and scarce coke. It will allow organizing more effective ladle process of steel production, to heat furnaces and apply oxygen, secondary emitted during the reaction of water decomposition, in convectors, but not produce it especially for this purpose. With this, tubes of metallurgical plants will stop to release the hundreds thousands tons of carbonic acid gas to the atmosphere.

This invention is the most interesting one for specialists, which work with the problems of separation of various inorganic materials, for example, with uranium enrichment. The suggested method allows dividing isotopes U235 and U238 continuously, simply and effectively, simultaneously extracting them from the water solution as a metal powder, i.e. to combine these two different processes in one high-performance and compact device.

The simplicity of EHG design to the industrial plants gives a possibility to develop a production run of some the simplest modifications of this generator for needs of small energetics during few months and without any particular technical-organizational efforts and significant investments. Modernization of active freight automobile and bus parks in the country can be the

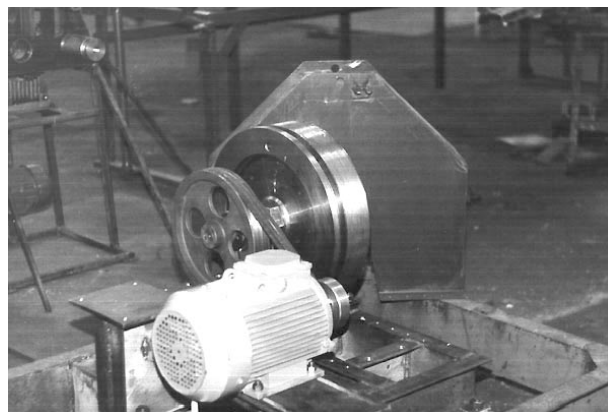
first stage of a large-scale application of the invention on transport. Some more spending and time will be required to develop EHG for other kinds of transport and powerful energy complex. But final qualitative results will be much more higher here. With serial production run of the generator in specific Russian conditions the cost of production of this device is evaluated to be 25-28\$/KWt of heat power. The estimated profitability of investment into the mastering of innovation constitutes more than 100% with the payback period of less then 1,5 years. The annual economic effect of application of the generator constitutes of about 87 \$/KWt of its heat power.

### Prototype

***You can address the authors for the detailed scientific and technical validation of operation process of gravitational electrolysis, comments and references of scientific institutions as well as design documentation and see the prototype of the generator.***

**Main features of the prototype of electrical hydrogen generator.**

1. Rotation frequency of the rotor, rpm	13000
2. Electrical drive capacity, kWatt	5
3. Productivity on hydrogen, liter per second	12,3
4. Heat power, kWatt	150
5. Mass, kg	143



*Editorial: below there is an information on interesting organizing aspects in the deal of development of the "Gravitational Electrolysis" technology.*

*On January, 2002 Mr. Studennikov presented a press release about GenOil Inc. He claimed that deal between Hydrogen Solutions Inc. and GenOil Inc was illegal. The new company Hydrogen Solution Inc. was created without participation of Dr. Studennikov who was one of principal co-authors of the technology. This fact violates author's rights, which officially belong to EHG Technology L.L.C. (co-owners are Mr. Studennikov and Mr. Kudimov).*

*Dr. Studennikov has an intention to appeal against Hydrogen Solutions Inc.*

# About Strange Effects Related to Rotating Magnetic Systems

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## Abstract

The basic hypothesis of topological geometrodynamics (TGD) is that spacetime is representable as a 4-surface in 8-dimensional space  $M^4_+ \times CP_2$ . The notion of many-sheeted spacetime forced by this hypothesis implies numerous new physical effects including gravitational anomalies, the possibility of negative energy spacetime sheets makes possible the overunity energy production and classical communications to the geometric past. The geometrization of the classical gauge fields in turn predicts the existence of long range colour and electroweak gauge fields, in particular classical  $Z^0$  field, which gives rise to macroscopic effects resembling those assigned usually with torsion fields. In this article the strange findings about the physics of rotating magnetic systems are discussed in order to illustrate the new physics predicted by TGD.

## Classical TGD in nutshell

Topological Geometro-Dynamics (TGD) is a unified theory of fundamental interactions, which appeared as an attempt to construct a Poincare invariant theory of gravitation [1,2,3,4]. Spacetime, rather than being an abstract manifold endowed with a pseudo-Riemannian structure, is regarded to be the 4-surface in the 8-dimensional space  $H = M^4_+ \times CP_2$ , where  $M^4_+$  denotes the interior of the future light cone of the Minkowski space (to be referred as a light cone in the sequel) and  $CP_2 = SU(3) / U(2)$  is the complex projective space of two complex dimensions [1]. The identification of spacetime as a submanifold of  $M^4_+ \times CP_2$  leads to Poincare invariance broken only in cosmological scales and solves conceptual difficulties related to the definition of the energy-momentum in General Relativity. Sub-manifold geometry, being considerably richer in structure than the abstract manifold geometry, leads to a geometrization of all basic interactions and elementary particle quantum numbers. In particular, classical electroweak gauge fields are obtained by inducing the spinor curvature of  $CP_2$  to the spacetime surface.

**TGD approach forces a generalization of the conventional spacetime concept to what might be called many-sheeted spacetime.** The topologically trivial 3-space of General Relativity is replaced with a "topological condensate" containing matter as particle like 3-surfaces "glued" to the topologically trivial background spacetime sheet by connected sum operation. Spacetime sheets have outer boundaries and

form a hierarchical structure. Macroscopic material bodies are identified as 3-surfaces with boundary identified as the outer surface of the macroscopic body. This implies a radical reformulation of the condensed matter physics. Spacetime sheets are connected to each other by wormhole contacts and join along boundaries bonds. Various new physical effects related to the many-sheeted spacetime concept are described in four books about TGD: see for instance, the chapters "TGD and Nuclear Physics" and "Anomalies Explainable by TGD Based Spacetime Concept" in [2]. Many-sheeted spacetime concept is especially important in TGD inspired theory of consciousness and its applications to biosystems [3,4].

## Various new physics effects related to many-sheeted spacetime concept

Many-sheeted spacetime concept implies several new physical effects. Effects important in the recent context are the following.

- a) Topological field quantization: classical fields have kind of a Bohr orbit representation as spacetime sheets. For instance, magnetic field decomposes to magnetic flux tubes with quantized magnetic fluxes so that spacetime 'ends' at the boundaries of magnetic flux tubes.
- b) **Spacetime sheets can have negative time orientation and negative energies.** This makes possible **effective over unity energy production** and classical signalling to the direction of geometric past (in TGD subjective time and geometric time are two different notions).
- c) Gravitational flux from a given spacetime sheet can be distributed in several manners among larger spacetime sheets in the hierarchy and effective gravitational flux from this spacetime sheet (its effective gravitational mass) to a given spacetime sheet can thus vary: this implies gravitational anomalies and can lead to an effective variation of the gravitational coupling constant. **Also the reduction of gravitational mass of rotating body becomes possible by a mechanism to be described in more detail below.**
- d) Vacuum can carry purely geometric charge densities: the electric potential associated with a rotating magnetic disk provides an example of this kind of effect observed already by Faraday. In Maxwell's theory this charge density must be due to charged particles.
- e) TGD predicts the existence of classical long-range  $Z^0$  fields above cellular length scale. In particular,  $Z^0$  magnetic fields are possible even when system has a vanishing  $Z^0$  charge density (neutrinos screen the  $Z^0$  charge of atomic nuclei). **The effects thought to be due to torsion fields [8,9] could be due to classical  $Z^0$  fields.** Large parity breaking effects in long length scales are the signatures of these fields.

Two examples of new physical effects not directly related to the recent context deserve to be mentioned because of their fundamental role in TGD Universe.

- a) The so-called 'massless extremals' (MEs) represent classical gauge fields propagating with light velocity without dispersion. The propagation of energy is channelled and the lightlike vacuum current at given point is completely non-deterministic so that classically **MEs are optimal for communications**. The lightlike vacuum current generates coherent photons and MEs act as quantum holograms. MEs play a key role in TGD inspired theory of consciousness [3,4].
- b) Manysheeted spacetime makes possible macroscopic quantum phases at non-atomic spacetime sheets, which contain very low densities of particles and can be in extremely low temperatures. In particular, the flux tubes of Earth's magnetic field carry ionic supra phases. These macroscopic quantum phases are crucial for TGD based model of biosystems [3,4].

### **The effects related to rotating magnetic systems and many-sheeted spacetime concept**

In the sequel the effects reported by Roshchin and Godin in their article 'An experimental investigation of the physical effects in a dynamic magnetic system' [5] are discussed as a possible manifestation of various new physics predicted by TGD. A more general discussion of various anomalous effects can be found in the chapter "Anomalies explainable by TGD based spacetime concept" of [2]. The model discussed here involves also new and crucial aspects, which became clear during writing of this article.

### **Gravitational anomalies and many-sheeted spacetime**

TGD spacetime is many-sheeted surface in  $H = M^4_+ \times CP_2$ , which can be regarded as the future lightcone of Minkowski space with points replaced with  $CP_2$  having size about  $10^4$  of Planck lengths. One can visualize the spacetime sheets as almost parallel pieces of plane glued together by wormhole contacts and also connected by join along boundaries bonds (for illustrations see my homepage <http://www.physics.helsinki.fi/~matpitka/illua.html>). The distance between the sheets is about  $CP_2$  radius.

**This makes possible antigravitation like effects** since a macroscopic object (itself a spacetime sheet containing hierarchy of smaller spacetime sheets glued to it) can feed its gravitational flux to several spacetime sheets. By modifying somehow the standard distribution of gravitational flux between various spacetime sheets, one could produce gravitational anomalies at a given spacetime sheet. More precisely, what happens is that the gravitational force experienced by the object is replaced with

$$F_{gr} = \sum_i M_i F_{gr,i},$$

where the summation over spacetime sheets is understood. This means that the simple Newtonian picture fails and the determination of the gravitational constant can give varying values.

The first idea to come into mind is that **this effect might be responsible for the huge loss of weight in the experimental arrangement studied by Roshchin and Godin [5]**. Part of the gravitational flux of the rotating magnet would flow to some other spacetime sheet than 'ours' so that magnet would loose part of its weight. The experiments suggest that effect can be very large (30 per cent loss of effective weight). A little thought experimentation however suggests that this mechanism very probably does not explain the observed loss of weight.

The loss of weight should relate directly to the rotation of the system and this serves as a hint about what might be involved.

- a) The gravitational flux of the rotating system runs to larger spacetime sheets by two alternative mechanisms: through extremely tiny wormhole contacts with  $CP_2$  size and via join along boundaries bonds connecting the boundary of the rotating spacetime sheet to the boundary regions of the larger spacetime sheets.
- b) When the system rotates, join along boundaries bonds (in particular, gravitational flux tubes) get entangled. This relates interestingly to the orientation-entanglement relation discovered by Dirac. When one connects the corners of a cube  $D_1$  to the corresponding corners of a larger cube  $D_2$  containing  $D_1$  by elastic threads and rotates  $D_1$ , the threads get entangled. Rather remarkably, for a  $2\pi$  rotation entanglement cannot be straightened out, but can be done so for a  $4\pi$  rotation: thus also classically  $2\pi$  rotation can be non-trivial operation physically! The reason is that the entangled threads provide a geometric representation for the homotopy group  $Z_2$  of  $SO(3)$  realized by the rotations of the smaller cube. Join along boundaries bonds carrying gauge and gravitational fluxes realize this fictive system invented by Dirac quite concretely in TGD framework.
- c) One might expect that if the rotation velocity gets too high, gravitational flux tubes are not able to straighten out their entanglement and begin to split much like the magnetic flux tubes of the solar magnetic field. The splitting generates negative and positive gravitational charges at the ends of the flux tubes. The gravitational flux entering to the external world from the rotating system is not changed but the gravitational mass of the rotating system itself gets gradually lower since it is gradually transferred to the boundary of the external world spacetime sheet where it acts like a surface charge.

- d) At the extreme situation system has neither wormhole contacts nor join along boundaries contacts to the larger spacetime sheets and **has a vanishing gravitational mass (using TGD terminology, system has suffered 'topological evaporation') in accordance with the fact that closed 3-space has a vanishing gravitational mass.** The system could still have an inertial mass so that equivalence principle would not hold true. The long length scale limit of TGD indeed allows also solutions, for which Einstein's equations are not true (see the chapter "TGD and GRT" of [1]).
- e) The findings of [5] suggest that at least 30 percent of gravitational flux of the rotating magnet flows join along boundaries bonds to the larger spacetime sheets. If magnetic flux tubes serve also as gravitational flux tubes, **the splitting would generate also effective magnetic monopoles.**

By its extreme generality, this mechanism might be behind all reported loss of weight phenomena, for instance, those reported in [6,7]. In particular, in the experiment by Podkletnov the effective reduction of the gravitational field above the rotating superconductor could be due to the rotation of the mass of air above the superconductor defining a spacetime sheet and leading to the splitting of the gravitational flux tubes so that the gravitational potential is reduced. For instance, pressure gradient is not anymore balanced by gravitational force and air begins to flow upwards.

An obvious question relates to the linear friction known to be proportional to the weight of the system (the reason for which is in fact still today poorly understood!). If gravitational join along boundaries bonds are responsible for the friction, then the proportionality of the frictional force to gravitational force could be understood. **If gravitational flux tubes split when the object slides sufficiently fast, the gravitational mass of the object should be reduced.** Note however that the object put in motion along the support of a scale does not demonstrate this effect since the support receives the lost gravitational mass. What would however happen is that the nearby gravitational field generated by the object plus scale behaves anomalously, since only part of object's gravitational mass would be moving.

#### Generation of negative energy spacetime sheets in rotating magnetic systems

The very fact that spacetime is a 4-surface means that energy momentum tensor is replaced with a collection of conserved vector currents. This makes Poincare invariance exact apart from a cosmological breaking caused by the lightcone boundary, and the notions of energy and momenta are well defined unlike in General Relativity.

One important implication is that the sign of the energy depends on the time orientation of the spacetime surface and both positive energy and negative energy

spacetime sheets are possible. The following argument supports the view that negative energy spacetime sheets are indeed generated by rotating magnetic systems. TGD allows purely geometric vacuum charge densities with no elementary particles acting as charge carriers. In particular, if one 'kicks' a 3-surface containing a constant magnetic field into a rotational motion, then vacuum charge density results. This is seen by considering a simple model for the imbedding of a magnetic field  $B_z(\rho)$  as an induced gauge field in  $M^4_+ \times S^2$ , where  $S^2$  is a geodesic sphere of  $CP_2$ . In spherical coordinates  $(\cos(\Theta), \Phi)$  for  $S^2$  the electromagnetic component of  $CP_2$  spinor connection is

$$A_\Phi = \cos(\Theta) \quad (1)$$

apart from a multiplicative numerical constant. The induced electromagnetic gauge potential is

$$A_\mu = A_\Phi \partial_\mu \Phi \quad (2)$$

as a projection of the component of the spinor connection to the spacetime surface. In cylindrical coordinate  $(t, z, \rho, \phi)$  for  $M^4_+$  one has for the imbedding of magnetic field as an induced gauge field

$$\cos(\Theta) = f(\rho), \quad \Phi = n\phi, \quad B_z(\rho) = \partial_\rho A_\Phi = n \partial_\rho f \quad (3)$$

where  $n$  is integer. Note that the imbedding necessarily fails at some critical radius since  $\cos(\Theta)$  cannot be larger than one: this is nothing but topological field quantization of magnetic field to flux tubes.

When the magnetic 3-surface is 'kicked' to a rotating motion one has

$$\cos(\Theta) = f(\rho), \quad \Phi = n(\phi - \omega t), \quad (4)$$

and an electric field

$$E_t = \partial_\rho A_t = -\omega \rho B \quad (5)$$

is generated.

The condition  $E_p = vB = \omega \rho B$ , **which can be interpreted as the vanishing of the net Lorentz force locally**, gives rise to a vacuum charge density

$$\rho_{vac} = -\partial_\rho E_p = -\omega B \quad (h/2\pi c = 1). \quad (6)$$

**The sign of the vacuum charge density depends on the direction of rotation.** This means a large parity breaking effect. It is very difficult to understand how the sign of the charge density could depend on the direction of rotation if charge carriers were ordinary elementary particles. Thus this effect, observed already by Faraday, seems to be in conflict with Maxwell's theory and to support TGD.

*Note from Faraday Lab Ltd: it is one more example of the advantage of experimental science by Faraday in front of theoretical science by Maxwell.*

Charge conservation requires that the radial electric gauge flux of vacuum goes somewhere at the boundary



of the magnet spacetime sheet. The only possibility is that a new spacetime sheet is generated parallel to the magnet spacetime sheet (unless it exists already). The electric flux runs through wormhole contacts or join along boundaries bonds to this spacetime sheet and back in radial direction at the second spacetime sheet. If this spacetime sheet has negative time orientation (guaranteeing that the sign of the electric field as tensor component  $F_{0r}$  changes), it has also negative energy, and energy conservation requires that the rotating system get positive compensating energy.

### Negative energy spacetime sheets and over unity energy production in rotating magnetic systems

As found, rotating magnet can generate a negative energy spacetime sheet and energy conservation requires that system itself get a compensating positive energy. This alone cannot however lead to overunity energy production reported in [5] and a more refined mechanism is needed. What is essential is that the negative spacetime sheet defines a quantum system in which particle energies are negative: the roles of creation and annihilation operators are effectively changed. It happens that negative energy spacetime sheet begin to be filled with negative energy particles, presumably photons and gravitons and perhaps even charged particles. **If the rate for the generation of negative energy in this manner overcomes the rate of the ordinary dissipation, the rotating system begins to accelerate.**

a) The electrostatic energy of the negative energy spacetime sheet is of order

$$E_e \approx -\frac{1}{2} E_m \omega^2 r^2 / c^2,$$

where  $E_m$  is the ordinary magnetic energy and  $r$  the radius of the rotating magnetic system.

b) **Overunity energy production requires that the rate for the change of the rotational energy  $E_{rot} = I\omega^2/2$  is positive ( $I$  is the moment of inertia), that is  $\omega$  increases spontaneously. This rate is given by**

$E_{rot}/dt \approx dE_e/dt + P - P_d$ , where  $P_d$  denotes the power dissipated by friction losses and  $P$  denotes the rate of negative energy generation due to the filling of negative energy particle states (at least photon and graviton states) associated with the negative energy spacetime sheet.

c) Since  $E_{rot}$  and  $E_e$  are both proportional to  $\omega^2$ , one has

$$d \log(\omega^2)/dt \approx 2(P - P_d)/(E_{rot} - E_e).$$

Since  $E_e$  is negligible as compared to  $E_{rot}$ , then  $\omega$  can increase only if one has  $P \geq P_d$ . Thus for  $P = 0$  spontaneous acceleration of the system is not possible. Notices that the splitting of the gravitational join along boundaries bonds between rotating system and external World could also reduce frictional losses and facilitate the effect. The proposed mechanism might

be called 'buy now pay later (or somewhere else)' mechanism. **The negative energy could leave the system and be received by some subsystem elsewhere. Instead of sucking energy from the external world, system sends negative energy to its surroundings or to parallel negative energy spacetime sheets.** This mechanism is crucial for understanding how negative potential energy, say gravitational energy is generated (a cloud of negative energy virtual gravitons represented as spacetime sheets), and is of utmost importance in TGD inspired cosmology: without it one could not understand huge energy densities generated near the moment of big bang (see the chapter "TGD inspired cosmology" of [1]).

### Coronal discharge and acceleration of ions in the electric field are generated by vacuum charge density

Standard wisdom suggests that the presence of coronal discharge in the experiments by Roshchin and Godin [5] could be analogous to what happens in TV screen when electrons accelerate in electric field and loose their energy by bremsstrahlung in collision with the 'wall'. In this case the electromagnetic potential energy difference in the radial direction at the spacetime sheet not containing the magnetic field is  $\Delta E = eV = e\omega B \Delta \rho^2$ , and causes acceleration since the electric force is not cancelled by the magnetic force. Thus the coronal discharge could be seen as an evidence for the many-sheeted spacetime concept. The objection against this mechanism is that also charged particles at the negative energy spacetime sheet should reside in negative energy states. If so, the acceleration of these charges means that they emit positive energy photons so that the observed radiation could result from this kind of process rather than from a collision with the 'wall'. A temporal mirror image of the bremsstrahlung process would be in question! Electrons and other ions, if present at the negative energy spacetime sheet, accelerate in this electric field. Depending on the sign of the charge, the acceleration occurs inwards or outwards. The sign of the acceleration is predicted to depend on the direction of rotation since the sign of the electric field depends on it. The intensity of radiation allows estimating the total number of ions present at this spacetime sheet: this number should be very small.

The maximum energy  $E_{max}$  of a photon emitted as bremsstrahlung is given by the maximal electric potential energy difference and a simple estimate gives  $E_{max} \approx 3 \text{ keV}$  for  $B=0.85 \text{ Tesla}$ ,  $\omega=500 \text{ rpm}$  and  $\Delta \rho=1 \text{ m}$ . Whether the bremsstrahlung type spectrum is really there could be easily tested. The charges in ionic clouds should have different signs for clockwise and counter clockwise directions of rotation since the signs of ions at the exterior boundary (and interior boundary) are opposite.

### Strange magnetic field structures

In TGD framework, strange magnetic field structures observed in the experiments by Roshchin and Godin

[5] and having geometry of cylindrical shells are identifiable as topological field quanta of the magnetic field generated by the rotating magnetic system (flux quanta could also carry  $Z^0$  magnetic fields, see below). **One could understand the lowering of the temperature inside the magnetic flux structures in the following manner.** In ordinary hydrodynamics the condition:  $p + \frac{1}{2}(\rho v)^2 = p_0$ , where  $p_0$  is the pressure in the region where flow velocity vanishes, holds true by energy conservation along flow lines. In magnetohydrostatics the corresponding condition reads as

$$p + \frac{1}{2}(e^2 B^2) = p_0 = n T_0.$$

Here  $p_0$  and  $T_0$  denote the pressure and temperature outside the magnetic flux tubes and the equation  $p = nT$  for ideal gas has been used.

The equation implies a lowering of the temperature as follows:

$$\Delta T/T = -\frac{1}{2} e^2 B^2 / p_0.$$

For a magnetic field strength of order 0.05 Tesla and pressure of one atmosphere ( $10^5 \text{ N/m}^2$ ) the estimate for the reduction is  $\Delta T/T \approx 10^{-2}$ , which is of the same order of magnitude as the reported reduction of temperature  $\Delta T/T \approx 6\text{K}/295 \text{ K} = 0.02$ .

#### **The classical $Z^0$ fields as TGD counterpart for torsion fields**

TGD predicts the existence of classical  $Z^0$  fields ( $Z^0$  bosons are ultraheavy companions of photons responsible for neutral current weak interactions; see the chapter "Anomalies explainable by TGD based spacetime concept" of [2]). The  $Z^0$  charge of the atomic nucleus is essentially its neutron number since proton's  $Z^0$  charge is very small. Neutrinos screen the  $Z^0$  charge of the condensed matter above length scales of neutrino Compton length that is of about cell size (see the chapter "TGD and condensed matter physics" of [2]). Under certain circumstances also  $Z^0$  electric fields can cause detectable effects. For instance, the TGD based explanations of the tritium beta decay anomaly [10], the acceleration anomaly of spaceships in outer space [11] discovered in NASA, and the anomalous variation of the radioactive decay rates [12] involve the interaction of small sized objects with large  $Z^0$  charges with astrophysical  $Z^0$  electric fields.

$Z^0$  neutrality does not exclude the possibility of  $Z^0$  magnetic fields: what is required that nuclei and neutrinos rotate with slightly different velocities. **Thus rotating macroscopic objects could generate  $Z^0$  magnetic fields and the claimed properties of the torsion fields [8], torsion are very much like those of  $Z^0$  magnetic fields.** In particular, also classical  $Z^0$  field has parity breaking axial coupling to elementary particles, and large parity breaking effects are predicted (chiral selection in living matter has explanation along these lines). The generation of classical  $Z^0$  magnetic field might be involved with the large parity breaking

observed in the experiments by Roshchin and Godin [5] (the critical rotation velocities were different for clockwise and counter clockwise rotations). Note however that also the sign of vacuum charge density involves parity breaking effect. It is also possible that flux structures carry combination of magnetic and  $Z^0$  magnetic fields and the strange shell like magnetic field structures could be accompanied also by  $Z^0$  magnetic fields.

To sum up, it seems that the experimental findings by Roshchin and Godin could be satisfactorily understood at the phenomenological level in TGD framework although quantitative modelling is not possible at this stage.

#### **Acknowledgements**

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But hopefully it is changing a little bit. At least now we cite chapter and verse when these things were done, and what they are, and the young grad students and post docs can go check the papers and make up their own minds.

That is the real hope of the future: that we get a generation of young fellows, with excellent skills, who now know where all the skeletons got hidden in the closet, and understand that the electrical engineering model arbitrarily assumes an inert vacuum environment (falsified for more than a half century in particle physics) and a local flat spacetime (falsified for nearly a century by general relativity).

Once they know that past history, and go read into what broken symmetry of opposite charges means for a dipole and for all dipolar EM circuits, they will set to and change that more than a century of error. In that case,

we shall have numerous solutions to the energy crisis rather quickly, popping up all over.

Good thing. It will certainly displace some great energy barons, but it will also free the populace. One can extract all the EM energy from the vacuum one wishes, anywhere, anytime, with ridiculous ease. One can produce that "electrical wind of energy" at will, by making a simple dipole and then letting it alone. The only energy problem is in how to then intercept some of that energy flow and "catch" it in a circuit, discharge it in a load to power it, and not use half the "caught" energy to kill that dipole that is gushing out the extracted EM energy from the vacuum.

Very best wishes,

Tom Bearden

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## The Transdimensional's Lifters Experiment

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In June 2001, Transdimensional Technologies has presented the *Lifter1* and *Lifter2* devices. The *Lifter1* device was built with three capacitors joined so as to form a triangle assembly and the *Lifter2* is three time heavier and three time bigger than the *Lifter1*. These devices are able to lift their own weight and they are a "modern version" of the Townsend Brown Electrokinetic Apparatus. The Lifters are using the Biefeld-Brown Effect to generate the main thrust to self levitate. I have already built some similar devices in April 1999, with "EHD Flying Saucer v1.0".

In Townsend Brown Electrokinetic Apparatus described in the US Patent N°2949550 filed on Aug 16, 1960 and titled "Elektrokinetic Apparatus" you will find the full description of the main principle used in Lifter devices:

*It is therefore an object of my invention to provide an apparatus for converting the energy of an electrical*

*potential directly into mechanical force suitable for causing relative motion between the system and surrounding medium.*

*It is another object of this invention to provide a new apparatus for converting electrostatic energy directly into kinetic energy.*

*It is another object of this invention to provide a vehicle propelled by electrostatic energy without the use of moving parts.*

*Another goal of my invention is to provide a self- propelled vehicle without moving parts. It is a feature of my invention to provide an apparatus for producing relative motion between structure and surrounding medium. This apparatus includes a pair of electrodes of appropriate form held in fixed spaced relation to each other and immersed in a dielectric medium and oppositely charged.*

*It is another feature of my invention to provide apparatus which includes a body defining one electrode, another separate electrode supported in fixed spaced relation by said body, and a source of high electrical potential connected between the body and the separate electrode.*

( Extract from US Patent N°2949550 filed on Aug 16, 1960 titled "Elektrokinetic Apparatus" )

The Lifter v4.0 specificationsThe Lifter v4.0 uses 36 asymmetrical T.T. Brown capacitors joined (called cells) so as to form a hexagonal assembly. Each asymmetrical capacitor is built with one electrode made with a thin corona wire placed at 30 mm from the main rectangular electrode constructed "ala" Townsend Brown.

- Weight : 32 g
- Size: 820x 700 mm and 40 mm high made with a thin aluminium sheet.
- Mounting legs: 30-mm length.
- Main frame: balsa wood 15/10 mm thick and 2 mm wide. The construction of the frame is lighter than the previous versions (half of the lower balsa frame has been removed).
- Power required to compensate the weight : 81.4 Watts ( 40.5 KV at 2.01 mA )
- Power required for a stable flight above the ground : 132.9 Watts ( 44 KV at 3.02 mA )

Today, I have replicated successfully the Transdimensional Power<sup>3</sup> Lifter1 and Lifter2 and developed some new enhanced and bigger versions. The Lifter V3.0 is a bigger version of the Lifter2 presented by Transdimensional Technologies in June 2001. The Lifter v3.0 uses nine asymmetrical T.T. Brown capacitors joined (called cells) so as to form a triangle assembly. It is 2.4 time heavier than the *Lifter2* and 7 time heavier than the Lifter1. The Lifter V4.0 is a bigger version of the Lifter v3.0. It uses 36 asymmetrical T.T. Brown capacitors joined (called cells) so as to form a hexagonal assembly and it is 2 time heavier than the Lifter v3.0.

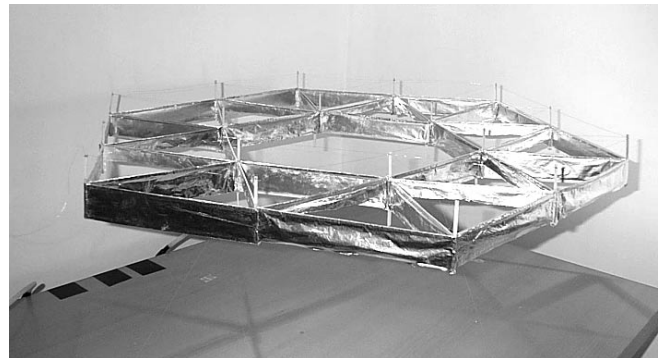
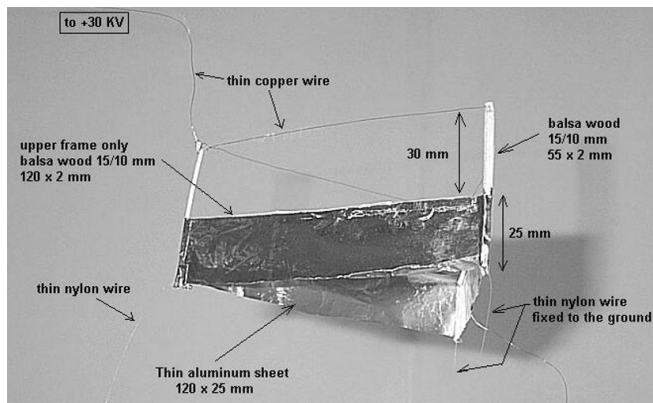
**Lifter v4.0 Test Results :** The Lifter v4.0 is the biggest one that I have built today. Its size in the lab is very impressive (820 x700 mm). The Lifter v4.0 is able to accelerate upwards very quickly and silently. The Lifter v4.0 has a weight of 32 g and it is very stable during the hovering.

**Lifters comparison chart:**

	Weight	Payload	Power to compensate the weight	Power for a stable flight
Lifter 1	2.3 g	1 g	18 Watts ( 40 KV at 450 uA )	23.9 Watts ( 41.9 KV at 570 uA )
Lifter 2	6.6 g	3 g	21.9 Watts ( 38.5KV at 570 uA )	48.5 Watts ( 43.35 KV at 1.12mA )
Lifter 3	16 g	4 g	45.4 Watts ( 18.45KV at 2.46 mA )	69.6 Watts ( 27.5 KV at 2.53 mA )
Lifter 4	32 g	-	81.4 Watts ( 40.5 KV at 2.01 mA )	132.9 Watts ( 44 KV at 3.02 mA )

For a tabletop demonstration you may use the basic lifter. The Basic Lifter is maintained on the ground base with 3 thin nylon threads to avoid that it escapes to the ceiling...

**Basic Lifter photo**



The Basic Lifter remains very stable above the ground while the power supply is energised. A 330 Kohms/10 Watts resistor is connected in series with the HV Output to limit the current flow. This High Voltage power supply is able to generate up to 25-30kV DC Output from 12-24v DC input. With a fully adjustable DC input power supply (0-24V/4A), it is possible to adjust the HV output between 5 to 30kV. This HV power supply uses a common flyback driver circuit with two 2N3055-power transistors as a push-pull oscillator. A common flyback transformer from an old TV/monitor can be used, the transformer HV output is connected to a 30kv Voltage tripler which commonly used in all colour TV monitors. In the Basic Lifter experiment the DC Input of the HV Power supply is 15 V at 2.3 A.

**Some Researches Projects planned:** Today, after a successful and impressive test of the Lifter v4.0, I have planned to build a device which will be able to flight by itself for few seconds with its own power on board. This will be a very good demonstrator for going further...

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# On the Great Constant 137.036

Dr. Anatoli V. Rykov

In the first half of XX century English astrophysicist Eddington stated that if physics find out a sense of a fine structure constant **137.036**, then many secrets of Nature would be discovered. Some incomplete examples of the manifestation of this constant are given below. As Ether does not admitted by traditional physics, these examples can cause criticism from its side.

## Electromagnetic radiation in Ether

The portion of electromagnetic radiation named photon of frequency  $\nu$ , deforms structure of Ether. Being in Ether with the size  $r_e$  between its elements, photon makes deformation  $\Delta r$ . Thus the energy of deformation will be  $e_o E \Delta r_e$ , where  $e_o$  is the electron or positron charge,  $E$  is the intensity of an electrical field. Energy of photon is equal to energy of deformation, where  $h$  is the Plank constant:

$$h\nu = e_o E \Delta r_e \quad (1)$$

This deformation depends on time. Photon is an electromagnetic phenomenon with the amplitude  $r \sin(2\pi\nu t)$ :

$$dr = d[r_e \sin(2\pi\nu t)] = 2\pi\nu r_e dt \cos(2\pi\nu t) \quad (2)$$

Let's determine the intensity of an electrical field, where  $N$  is a certain factor of proportionality:

$$E = N\xi \frac{e_o}{r_e^2} \quad (3)$$

Let's substitute the received ratio (amplitude from (2) and intensity from (3) to (1):

$$h = 2\pi N e \xi \frac{1}{r_e / dt} \quad (4)$$

It is possible to assume that  $r_e / dt = c = \sqrt{\nu \xi}$  is the speed of light.

Let us note that this assumption seems to be natural, but not obvious. Let's determine the unknown number:

$$N = \frac{h}{2\pi e_o^2 r_q} = 137,036 = \alpha^{-1} \quad (5)$$

Where  $r_q = \sqrt{\xi / \nu}$ ,

$$\nu = \frac{1}{\mu} = 1,0000000028 \cdot 10^7 [a^2 kg^{-1} M^{-1} s^2]$$

is a magnetic constant of vacuum, which is equal to reversed magnetic permeability,

$$\xi = \frac{1}{\varepsilon} = 8,98755179 \cdot 10^9 [a^{-2} M^3 kg s^{-4}]$$

is an electrical constant of vacuum equal to reversed dielectric permittivity. Thus, interaction of electromagnetic radiation (photon) with Ether is related with the number **137.036**. It, probably, characterizes some cluster of ether, which is related to photon. Let's receive the known formula for a Plank constant from (5):

$$h = 2\pi e_o^2 r_q \alpha^{-1} \quad (6)$$

All components, included in the Plank constant, completely concern to structure of Ether. The conclusion is the following: the so-called «ultra-violet catastrophe», which has put under doubt a correctness of classical physics, is a completely far-fetched problem from the point of view of existence of Ether. It is simply solved by ability of ether to perceive and to transfer radiation only as quantum.

We should construct elements of structure of vacuum on the well-known experimental fact. There is an equation of photon energy for the frequency « of red border »  $h\nu_{rb}$  and energy of pair

$$w = \xi \frac{e_o^2}{r} = 2\pi \alpha^{-1} e_o^2 r_q \nu_{rb} = 1,6493 \cdot 10^{-13} \quad (7)$$

From (7) we can find the size of a structural element:

$$r_e = \frac{\alpha^{-1} \xi}{2\pi r_q \nu_{rb}} = 1,398688 \cdot 10^{-15} \quad (8)$$

Therefore, we have the distance between virtual electron and positron charges forming a bond charge or dipole of Ether.

The «red» border of its «destruction» at the photoelectric effect is determined from:

$$\Delta r_{rb} = \frac{h\nu_{rb} r^2 \alpha}{e_o^2 \xi} = 1,020672 \cdot 10^{-17} \quad (9)$$

The dipole deformation is less than the given value and it should have an electroelastic property. When the value of deformation increases, it leads to destruction of dipole and a pair of free electron and positron will appear. A remarkable consequence from the formula (9) is:

$$\Delta r_{rb} = 1,020672 \cdot 10^{-17} = r_e / 137.036 \quad (10)$$

Again we have received a constant **137.036**. Now it is related with deformation properbonds of Ether structure.

Nature gives us some help: a certain hierarchy in a structure of matter is observed during consideration of the growth of masses of fundamental particles  $2 \cdot 137.036 m_e$ ,  $2 \cdot 137.036 \cdot 7 m_e$  and  $2 \cdot 1836 m_e$ . Masses of pair of electron - positron will form masses of pions, proton, antiproton, and neutron. Number 1836.125 is a mass number of a proton. Number 1838.6 is a mass number of a neutron. It is easy to notice that a structural element is the mass  $2m_e$ . Let's multiply it on  $137.036 \cdot 2m_e = 274.0720 \cdot m_e$  and we will get a value, which is very close to the pion mass  $m_{\pi(+ -)} = 273.2 \cdot m_e$ . Such concurrence does not seem senseless. Pions represent particles formed from electron and positron. In  $\pi_0$  -pion the integer of 264.2 are masses of electron and positron. The integer determines a zero-charged pion «0», and the minus 9.872 can be accepted as a mass equivalent to energy neutral pion connection. In  $\pi_+$ ,  $\pi_-$  pions contain the odd number of electron and positron masses 273. The nature again prompts, that  $\pi_+$  pion consists of one superfluous positron, and  $\pi_-$  consists of one superfluous electron. It is clear that pions represent a single unit (indivisible quantum systems capable to virtual and real existence according to their short time of life). The lack of mass charging pions up to number 274.072 can be treated as a defect of mass of bond or energy of bond  $\Delta m_{\pi(+ -)} = 0.8720 \cdot m_e$ . It is possible to assume two variants of mass defect for pion «0»:

$\Delta m_{\pi 0} = 1.8 \cdot m_e$  or  $\Delta m_{\pi 0} = 9.872 \cdot m_e$ . These variants can be distinguished by the time of pion life «0». The greatest time of particle life, at which mass defect is maximal. As pion «0» has time of life less, than at charged pion, it is necessary to accept the first variant, i.e.  $\Delta m_{\pi 0} = 1.8 \cdot m_e$ .

It is possible to assume, that the protons and antiprotons can be formed from mesons and pions. For example, the particle with mass equal to 1836,12 electronic masses (proton) can contain 3 pairs charged pions, one positive pion and 7 neutral pions. Structure of a proton or antiproton contains charged mesons, participating in strong nuclear interactions. Superfluous mass in 1836 electronic masses makes mass defect equal to bond energy. It corresponds to the huge energy providing large stability of protons. You can see the role of number **137.036** on the given examples of a structure of matter.

The De Broglie's formula  $\lambda = \frac{h}{mV}$  is used for calculation

of a wavelength of a particle movement. It is shown above that the Plank's constant depends on parameters of Ether and the constant **137.036**. Particle, moving in Ether structure, produces transverse fluctuations with frequency  $\nu = c / \lambda$ . Thus, the given frequency or given length of a wave will be formed only with the movement of particle in Ether. Particle moves by spiral trajectory

with a step of the screw  $\lambda = \frac{h}{mV}$  and it is the reason

for the particle diffraction phenomena. The amplitude of a wave can be determined by the formula

$$A = \frac{e_0^4 137.036}{(vm)^2 \Delta r_e}. \text{ This amplitude depends not on the}$$

speed of a particle, but on structural elements of Ether (dipole charge, the number **137.036** and deformation limit), on mass of a particle and, especially, on the Ether magnetic constant. We shall receive amplitude equal to  $1,066134 \cdot 10^{-10}$  (m) for electron, for a proton it will be  $3,162334 \cdot 10^{-17}$  (m). A large difference in amplitudes is due to a square law dependence of amplitude on mass of particles. It can be checked in experiment on diffraction of electron and proton beams. The amplitude of particle's trajectory is formed in open Ether. Hence, at the presence of a nucleus of atom or other particle (changing parameters of Ether structure) the amplitude of trajectory can be different.

Ether structure and the constant 137.036 also define Compton length of the electron wave:

$$2\pi(r_e + \Delta r_e) \cdot 2 \cdot 137.036 = h / m_e c = 2.42626 \cdot 10^{-12} \text{ (m)}$$

### Generality of ether of three different levels

The interactions of electromagnetic radiation with Ether can appear on three levels, those are space, meson and

nuclear level. Length of a «red border» wave  $\lambda_{rb} = \frac{c}{\nu_{rb}}$  of a photo effect in the space Ether is an additional tool to research structure of Ether. There is a formulation

$$\frac{1}{2\pi 137.036 r} \left( \frac{c}{\nu_{rb}} \right) \equiv 1. \text{ Index } i=e,\pi,p \text{ corresponds to three Ether levels in the generalizing table of its structural elements. The "red border" frequencies are equal to } \nu_{irb} = w_i / h.$$

Table 1

$i$	$w_i = h\nu, J$	$2m_i c^2, J$	$w_i - 2m_i c^2, J$	$r_i, m$	$\Delta r_i, m$
e	$1,649459 \cdot 10^{-13}$	$1.637422 \cdot 10^{-13}$	$1,203700 \cdot 10^{-15}$	$1,398688 \cdot 10^{-15}$	$1,020672 \cdot 10^{-17}$
$\pi$	$4,487716 \cdot 10^{-11}$	$4.473438 \cdot 10^{-11}$	$1,427800 \cdot 10^{-13}$	$5,140876 \cdot 10^{-18}$	$1,635613 \cdot 10^{-20}$
p	$6,013007 \cdot 10^{-10}$	$3,010701 \cdot 10^{-10}$	$3,010701 \cdot 10^{-10}$	$3,836815 \cdot 10^{-19}$	$3,836815 \cdot 10^{-19}$



The main conclusion is: electromagnetic phenomena at all three levels of Ether are equivalent and they are determined by the number **137.036** and speed of light (dielectric and magnetic Ether constants).

**Ratio of speed of light  $2.99792458 \cdot 10^8$  to speed of the movement of electron on the first orbit of atom of hydrogen  $2.187691 \cdot 10^6$  is equal to 137.036.**

**Gravitational constant of Ether of the Universe also depends on Ether basic parameters and number 137.036:**

$$G = \xi e_o^2 \cdot 137.036 / m_{Pl}^2 = 6.6726 \times 10^{-11},$$

where Plank's mass is a denominator.

**Inertial force of the mass  $m$  and its acceleration  $a$  are also determined by parameters of Ether and the constant 137.036**

$$f = ma = 15.5\pi \cdot 137.036 \cdot b \cdot \Delta r_a,$$

where  $b = 1.155065 \cdot 10^{19} (\text{kg/s}^2)$  is **an elasticity of Ether structure**. This formula shows how it is possible to transform elastic energy of Ether to energy of substance at acceleration of mass.

*Editor's: Theory by N.A. Kozyrev considers the cause-effect relations from positions of the concept of active properties of time. In this concept the speed of the course of time is defined as a ratio of*

*distance between the cause and the effect to the period of the time delay between them. For our space it is equal to the product of the speed of light and Zommerfield's fine structure constant, i.e. the speed of the course of time is 137 times smaller than the speed of light. Let's note, that it is not the speed of motion in space, but the "rotation speed of the cause-effect connection". To my mind, there is a clear analogy between this four-dimensional rotation and the so-called torsion technologies. In his work Dr. Shipov presents the mathematics of four-dimensional rotations and firstly introduces the notion of torsion fields. Besides, Dr. Spartak M. Polyakov in his work noted the features of the internal structure of photon. On the assumption of this structure, minimal prolongation of any electromagnetic quantum is equal to the product of the wavelength and ratio between the fine structure constant and the speed of light. So, the internal structure of photon according to Polyakov reflects the features of inner structure of space, according to Kozyrev. This link between two theories had not been discussed before. The work by Rykov about fine structure constant is another theory, which can be used to create a new scientific paradigm of Ether. In my view, there is some analogy between Rykov's notion of "elasticity of Ether structure" and Kozyrev's "hardness of cause-effect connection".*

*Alexander V.Frolov*

## There are no Secrets in Inertialess Motion and Antigravitation

Dr. Anatoli Rykov

Actually the way to open this secret was shown by the article "Structure of vacuum and community of interactions" and the publication "Principles of ether theory" [1]. The main thing to be done successfully in these works was to find the structure of ether. It was formed by massless elementary charges (+) and (-), analogs of electron and positron. The basic distance or arm of dipoles formed by charges is equal to  $1,398688 \cdot 10^{-15} \text{ m}$  and a limit of electroelastic deformation was determined according to photoeffect in vacuum (ether) and it is equal to  $1,020672 \cdot 10^{-17} \text{ m}$ .

Interaction of usual substance and ether takes place through the forces of gravity and inertia, through electromagnetic tensions. Deformation of ether from acceleration of forces is given by the equation:

$$\Delta r_g = \sqrt{\frac{g}{4\pi E_\sigma S}} = 1,2703 \cdot 10^{-22} \text{ [m]}$$

To make the formula shorter the value of gravity acceleration was already substituted as acceleration of Earth  $9.82 \text{ m/c}^2$ . Direction of deformation coincides with the slope of the bob to the Earth. **To decrease gravity we should only decrease the value of deformation in this direction.** We can do it by electrical or magnetic effect around the body that we want to have antigravitational properties. Classical way to affect the value of above-mentioned deformation by another body is to place another cosmic body (for example, the Moon). **In the point of libration between the Earth and the Moon there is ether with zero deformation and accordingly the forces of gravity regarding the Earth and the Moon are absent in this point. The cause of it is evident. The Moon creates deformation of ether in this point, which is equal by the value and inverse by the sign of deformation of ether from the Earth.**

What is inertia from the point of view of ether structure? It is determined by the ratio:  $f = ma = 16\pi\alpha^{-1}b \cdot \Delta r_a$ , where  $m$  is mass of the body,  $a$  is acceleration of the body,

hardness was observed at 6-8%, i.e. weakening of metal took place. For the high-carbon alloys (steel of V-8 kind, cast iron ) the increase of hardness took place at 27.0-35.0%, which is the evidence of occurred hardening.

Thus, it was stated that AR influences the atomic- crystalline state of ferricarbonic alloys, and it was proved by the change of hardness.

/Signed/

L.A.Dachno

The chief of laboratory of metal - management and plastic deformation

The characteristic of a sample of metal	Value of microhardness, kg/mm <sup>2</sup> * H%, H (relative change of microhardness)				
	Initial condition	Source AR-FeO	Source AR-Mn	Source AR-C	Source AR-Se
Steel 08J (C=0.08% of weight, annealed, sheet)	161.2±2.4	151.6±3.0 (-0,6%)	148.2±5.3 (0.8%)	164.8±5.4 (+2.0%)	151.7±4.8 (-6.0%)
Steel U-8 (C=0.8 of % of weight)	636.6	60.5±30.8 (+35.0%)		810.4±17.4 (+27.0%)	
Cast iron (C>2.5%)	361.4±9.8	521.3±68.7 (+31.0)			

## Inertial Propulsion Drives

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### Introduction

The notion “inertial propulsion system” or device, which is moved by means of inertia forces, requires an exact definition. Usually the “drive” is a wheel, track, propeller or gas flow reaction. By means of “drive” the moving device is attracted or repulsed to the support, which exists outside the device.

Inertial drive does not interact with any support outside the device, but it interacts with the body of device by means of inertia force.

So, it is more true to name the inertial drives as an “inertioid” according to inventor Tolchin, Perm city, Russia. He has been made such sort of systems for more than 30 years [1]. His book about mechanics of 1969 was the cause for critical attacks on inertioids. For example, Dr. Gulia [2] states that unidirectional motion by means of inertia forces is impossible. But other scientists [3] like Dr. Levinson L.B., for example, wrote that all calculations in techniques take into consideration real inertia forces.

So, the notion of inertioid depends on the notion of inertia. Theoretical researches have a conclusion: reality

of inertia forces follows from Newtonian mechanics, but the fictitious inertia forces are the effect of Einstein's relativity theory.

According to Newton, there are three real inertia forces: second law force, centrifugal force, Coriolis force. Let's consider the notion of space and forces.

### Space

According to modern concept, the space is a closed material medium (Ether), which expands. All bodies are connected by gravitation field and they move. Magnetic, electric, electromagnetic and gluon fields also exist in vacuum. The space does not exist without a physical vacuum, which is a material medium, like river and sea cannot exist without water. Physical vacuum consists of moving virtual particles. The geometry of the space is Euclidian.

### The Gravitation Field

The value for intensity and distance of propagation of gravitational field in space depends on the value of mass, numbers of atoms; those consist of particles (protons, neutrons, electrons). Each particle has its own gravitational field and it conforms to the fact: air atmosphere of the Earth (atoms and molecules) is kept near the planet by gravitational field. From Mendeleev's periodical table it is obvious that atom, which has more protons, neutrons, electrons, has greater mass and gravitational field. So, gravitational field of any body is a joint, total field of all neutron, proton, electron

gravitation fields, but we suppose that it is not the curved space geometry according to Einstein's relativity theory.

Gravitational fields penetrate all space of the Universe. Gravitational field of any body is motionless relatively to its surface. The Earth rotates and its gravitational field rotates also. It is the main aspect for determination of the Earth inertial system.

### Newton's Law

The first Law is a law for inertia by Galilee - Newton. Newton's formulation is: Any body keeps its rest state or even rectilinear motion before the applied forces make it to change this state [4, p.36]. Conclusions: 1. Space doesn't prevent even the rectilinear motion. 2. Space order and define the rectilinear trajectory for motion of the body since space geometry is Euclidian.

The third law. Newton's formulation: For action there is always an equal and opposite reaction, or interaction for two bodies on each other is equal and directed in opposite sides [4, p.38].

The second law. There are different modern formulations for this law. One of them: Force is the product of mass and acceleration, which force creates for this body [5]

$$F = ma$$

where **F** is force, **m** is mass, **a** is acceleration.

Yablonsky A.A. describes this law in more exact version. According to Yablonsky, "ma" is a reaction force, or inertia force according to the third law. It is a real force [6, p.10]. According to Newton, inertia force is "Inborn force" of matter, which has a property to resist acceleration; due to this force any body keeps its rest or even rectilinear motion. This force is always proportional to the mass. Inborn force can be named as inertia force. It is demonstrating itself when other force makes changes in the body state. Demonstration of this force can be considered in two versions: as a resistance and as a pressure. It is a resistance since the body tries to keep its state and it is a pressure since the body yield to the force of resisting barrier and tries to change the state of this barrier [4, p.24, 25].

So, Newton named the inborn matter force as inertia force and he divided its manifestation into resistance and pressure. Modern mechanics classifies forces to be active (those can make the work) and passive (inertia, friction, reaction...). So, in modern understanding, resistance is a passive force action and pressure is an action of active inertial force from the body to other bodies. Newton's inertial forces, both passive and active are volumetric forces since they consist of the proton, neutron, and electron inertia forces sum. Proofs of this fact are Galilee's and Newton's experiments for different masses, different material bodies drop; and also the proof is a weightlessness state of the body. Active inertia forces (according to Newton) have been using

from the ancient times: stones, arrow and bullet... These forces are great and we cannot call them fictitious. Some inventors use Newton's active inertia forces for motion of inertioid.

### Centrifugal Inertia Forces

There is a contradiction for centrifugal forces notion in mechanics: in one case it is a real force but in other case it is not a real force.

There is a formula

$$F = \frac{mv^2}{R}$$

where m is the mass of the body, v is linear velocity of the body, R is radius of the circumference. The properties of the force, which change the direction of the motion, are not taken into consideration here. For example, Dr. Gulia explains the fictitious nature of the centrifugal force: Circular motion is forcible, since the centripetal force should be applied to the body by means of a thread. In the difference to centrifugal force, this force (centripetal) is real... Centripetal acceleration, according to Dr.Gulia, is directed to the centre. Centrifugal force is directed from the centre. But the real force cannot be directed in opposition to the created acceleration. So, according to Dr. Gulia, centrifugal force is not real but fictitious [2, p.18, 19]. Academician Ishlinsky also agrees with this conclusion [2, p.4, 5].

Logically it is true, but it leads to a paradox: there is acceleration, but velocity does not change. The kinetic energy of the body must also change, since force makes the body to accelerate; but kinetic energy does not change.

There are no paradoxes in Nature. So, some notion is wrong in this case. In contradiction to Dr. Gulia's conclusion, there is Max Born's and Landau's proof of reality of the centrifugal acceleration, and the proofs of both centrifugal and centripetal forces [7, p.33, 83-86] and [8, p.64]. Einstein also recognised the reality of the centrifugal force and he introduced the notion of the centrifugal field [9].

There are many applications of real centrifugal forces: separation of particles in centrifuges, in washing machines, in pump... Centrifugal forces compensate gravitational force on the planet orbit of the satellites. Inventors can use centrifugal forces for motion of the devices.

So, what is the mistake in the notion of the even circular motion? The answer is simple: For even motion of the body along the circumference trajectory the deviation from rectilinear motion is a result of the reaction of the connection, but it is not a result of the active external force. This reaction force don't make the work and it don't produce the acceleration. So, centripetal acceleration is fictitious instead of centrifugal force. The formula  $\omega=v^2/R$  is not a description of the centripetal

acceleration, and the formula  $F=mv^2/R$  is not an expression of the Newton's second law. Let's note that Newton explained: The change of direction of the motion along circumference is produced by reaction force.

### **Coriolius Inertia Forces**

This force is created, when the body moves along the curve-line trajectory and curvature radius changes. The angular velocity is constant in this case and there are two velocity components: linear (tangent) and radial (normal) components. If body moves spirally and it approaches to the centre, then the angular velocity should increase (if there is no resistance to motion) and some deceleration is necessary to keep constant angular velocity. So, Coriolius active force of inertia is created as a reaction to this deceleration force and its vector is co-ordinated with linear velocity vector.

If the body moves spirally from the centre, so it is necessary to use some force to keep the constant angular velocity. This force is co-directed to the linear velocity vector and reaction for this force is a Coriolius passive force.

Such sort of forces is demonstrated in Nature: rivers move from the North to the South or from the South to the North undermine their left and right riversides differently. Inventors can use Coriolius active force in inertoids.

### **Fictitious Inertia Forces**

Fictitious inertia forces are used for simplification of calculation for the relative motion in the non-inertial system, i.e. in systems, which move with acceleration.

According to Yavorsky B.M. and Pinsky A.A.:

1. Inertia forces have some properties, which are different from interaction forces (elastic, electric, gravitation, and friction forces). The main differences are:

- a) Inertia force is not a result of the body's interaction but a result of accelerated motion of the system itself; so the third law of Newton is not available for inertia forces.
- b) Inertia force acts to the body in non-inertial reference frame only, there is no such sort of force in inertial system.
- c) For any bodies there are non-inertial reference frame, for which the inertia forces are external forces, so there are no closed systems here and conservation law is not available in this case.
- d) Note, that inertia force like gravitational force is proportional to body mass so in the inertia force field (like in gravitational force field) all bodies move with the same acceleration, which does not depend on the mass of the body.

2. There is no inertia force in the inertial reference frame. So, the application of inertia forces for such sort of system is a mistake. In the inertial reference frame the notion "force" is available only in Newtonian sense, and

it is a measure for interaction between bodies. In non-inertial frame of reference the inertia forces are acting by the same way like interaction forces. So, sudden deceleration of the car produces inertia force, which throws you forward, and you feel this real force like gravity force [5, p.251].

*These explanations of inertia forces properties allow us to make the following conclusions:*

The above-mentioned notion of inertia is tangled, contradictory and it does not correspond to reality in some aspects. But in the points a) b) c) the fictitious inertia properties are described. In the point 2 a real Newtonian force of inertia is described.

**The main difference between fictitious and real inertia forces is a reference frame.** Special reference frame is necessary for fictitious forces. Real forces act in inertial or non-inertial frames. All living world feel such sort of forces in the process of motion, when the velocity changes.

The statement of Yavorsky and Pinsky number 2 about the absence of inertia forces (for inertial reference frame) is wrong. In this case only fictitious inertial forces are absent. For example, motion of the piston in motionless device is the motion in inertial reference frame if co-ordinate system is considered to be related with this device. So, the changing linear velocity of this piston is a reason for inertia forces. But forces are also acting for the piston independently from our consideration of the co-ordinate system. The choice of inertial or non-inertial reference frame is necessary only for design and calculation purposes.

What is the source of "fictitious inertia force" notion? We explained the nature of fictitious centrifugal and Coriolius forces above. Now let's consider the nature of fictitious inertia forces for the case of rectilinear motion. Inertia forces are created when the velocity of motion changes. The motion is described by different ways: Newton's motion is absolute; according to Einstein it is relative. Newton's explanation of absolute and relative motion is: True absolute motion can be produced or changed only as result of force action, which is applied directly to the moving body; relative motion can be produced or changed without application of the force to this body and in this case it is enough to apply the force to other bodies. In relation with these bodies, motion of the body is determined [4, p.33].

Einstein's explanation of motion: Any motion is relative by definition. A car moves relatively to the road and the road moves relatively to the car. In the first case, reference frame is a road; in the second case the reference frame is a car. For simple description of motion there is no difference in principle, what is the reference frame for motion [9, p.196].

But in reality there is the difference. If force is applied to a car and it moves with acceleration. According to classical mechanics, the car increases its kinetic energy

as well as quantity of motion. If the car stops, this energy will be transformed by means of friction. In another case, the road, station and the entire world move with acceleration if the reference frame is a car. According to classical mechanics, the road, station, etc. have an increasing kinetic energy as well as quantity of motion from nothing. If the car stops, this energy and quantity of motion must vanish in nothing.

This is the reason for fictitious nature of inertia forces. To separate it from the real forces, Newton used the notion "absolute" for true motion and "mathematical" for relative motion. But in more general sense, the absolute motion takes place in material medium, i.e. in physical vacuum, relatively to gravitational field. Accelerated, even rectilinear motion and even motion along the circumference are the absolute motion.

Einstein considered the **true** and **mathematical** motions as one relative motion.

### **Inertial Drives Description**

***Inertial drive is a mechanism, which moves unidirectionally by means of active inertial force produced by moving inner support to the body of the device.*** Several inner supports can be used in devices of one type. The inner support creates a closed cycle of action on the body of the whole device. Unidirectional motion of the body is a result of created non-balanced pulse inertial force action in one period (cycle) of the inner support action. Solid body or liquid can be used as inner support, which moves in return-forward way, or it oscillates around the axis, or it rotates around the axis, which is connected with the body of the device.

***The Newton's, centrifugal and Coriolis inertial forces or superposition of all these forces can be used for inertial drive.***

By means of different schemes the author of this paper created many devices. Energy of motion is transmitted from electromotors or from solenoid (electromagnets) or from other electrical devices. Unbalanced inertial force impulse for most devices is created by means of partial compensation of the negative force pulse of the inner support.

The demerits of the inertoids devices created by the author are small velocity and small propulsion power, which is not sufficient to fly up and move the device in space.

***The merit of inertoids is the possibility of reactionless motion, which allows creating an accelerated motion without reactive fuel. Also devices have high efficiency factor.***

### **On Space Application of the Inertoid Drive**

Human came to space by means of the powerful reactive propulsion drive. Next step in cosmos assimilation is

interplanet spacecraft. Reactive drives are not available in this spacecraft since it uses a lot of fuel and its efficiency is very small. So, the interplanet flight needs a non-reactive type drive. Academician Korolev S.P. and Kurtchatov I.V. understood this aspect clearly and they made a requirement on government resolution of 23 June 1960 #715/296 on the new principles for reactionless propulsion [10].

There is the question: what is the pre-condition for inertial drive? Many scientists stated that accelerated motion in space is impossible without any external support since it contradicts to the law of momentum conservation. For example, Dr. Gulia, expert on inertial mechanisms of the State Inventions Department of Russia, wrote that there is no support in space, so in empty space movement is possible only by means of reactive systems [11, p.22].

Do inertial drives really cannot be used in space? To move space apparatus in vacuum with some acceleration it is necessary to increase the quantity of motion and its kinetic energy (if the velocity increases)... So, we can assume that inertial drive leads to violation of the law of momentum conservation. But this law also is not valid in the case of ordinary rocket. For example, momentum created for rocket is more than momentum of fuel and the difference depends on the design of the rocket nozzle [2, p.24] and [13, p.20]. Also, conservation of the moment is violated and cosmonaut V. Lebedev makes his body to rotate by means of inner forces in the weightlessness state [14, p.68].

So, the claim that "it is impossible to make motion by means of inner forces" is not connected with inertoids, since inertia forces are external forces. (*Editor's: these forces are external because they are produced not by the body, but by space itself, which reacts on the accelerated motion of the body*). Inertia forces are the result of change in velocity or direction of motion in physical vacuum but for physical vacuum there are no closed systems. So, inertial drive can move itself by means of active inertial forces. It is not a reactive but active type of motion. (*Editor's: it is necessary to note that this term "active motion" was introduced at first by the author in 1996. The Scientific Congress "New Ideas in Natural Science", Saint Petersburg*).

It is necessary to remove the mistakes from mechanics and to organize serious researches on inertial drives. In this case it is possible to create an inertial drive, which can be used for spacecraft propulsion. It is necessary to solve one problem to find a closed cycle of the inner support, which has the unbalanced inertia force moment.

What are the pre-conditions for it?

1. It is an application of the difference between momentum and kinetic energy of the moving inner support, that mathematically is shown as the difference between  $p = mv$  and  $W = (mv^2)/2$ . To change the momentum of some body it is necessary to act on the

body with the force  $F$  during some time  $F t = m v$ . But to pass kinetic energy it is necessary to make the work of the force  $F$  on the way of length  $l$ , i.e.  $F l = (m v^2)/2$

This difference allows creating different inertial drive cycles, taking into account the transformation of kinetic energy into other energy forms.

2. There is an inadequacy between momentum and kinetic energy due to the factor of velocity ( $v$  or  $v^2$ ), which increases if the inner support makes translational motion plus rotational motion. (*Editor's: Thus, we get a helical trajectory of motion. This type of motion is commonly used in Nature*). In this case the force is created of two components: translational and rotational

$$\frac{m v^2}{2} + \frac{I \omega^2}{2}$$

where  $I$  is the inertial moment of the body,  $\omega$  is the angular velocity. Inertial drives of several types cycles can be created by means of this principle.

3. Repulsion between two bodies (for the case of different masses) leads to the equal momentums, but different energies, which are reverse proportional to the mass value according to the law of momentum conservation:  $m_1 v_1 = m_2 v_2$

$$\text{but } \frac{m_1 v_1^2}{2} \text{ is not equal to } \frac{m_2 v_2^2}{2}$$

This property of the interaction between the bodies also can be used to create inertial drive cycles of different types.

4. Acad. E. Alexandrov made a very interesting discovery: new (after Newton) correction of theory of collision, since the momentum and kinetic energy are transmitting to the body of the device from the inner support of the inertial drive by means of collisions [15].

5. The author didn't investigate the liquid-steam closed cycles to create reactionless motion. Calculations show that in this case there is some discordance between the law of energy conservation and the law of momentum conservation. Specialists, who calculate thermal cycles (isobar, isothermal and adiabatical), usually don't take into account the law of momentum conservation. There is a wide area, which is not investigated yet in aspect of reactionless motion. There is an idea to close the single reactive process in the closed cycle without mass wasting. (*Editor's: We should note that this topic was considered in details in "Reactionless Propulsion and Active Force" by Alexander V. Frolov. At first it was reported in 1996, The Scientific Congress "New Ideas in Natural Science", Saint Petersburg. Development of this idea was started in 1994 in close collaboration with Acad. Vladimir I. Zubov*).

6. Newton's laws are presented in physics textbooks in superficial way. These laws describe the properties of material world, but its basis lies in quantum mechanics,

i.e. in the microworld but not in classical mechanics. Due to this reason all industry, transport and space techniques is created according to these laws, and nobody can refute Newton's laws.

Some enigma is hidden in the second and the third Newton's laws. A body moves with acceleration in space under the action of the force (the second law) but for any acting force there is some opposite and equal inertial force (the third law). These forces are in equilibrium and resultant force is equal to zero that means a static situation, but really the body moves with acceleration. The motion can be called dynamical motion, if forces are in equilibrium. In another case the even motion of the body along circumference is also static, since these balanced forces act to the body. But this motion is named as inertial motion, but not dynamical. This enigma is a property of space and it is hidden in the microworld.

The author made an attempt to use the difference between dynamical motion and inertial motion to create the experimental systems to demonstrate reactionless motion. It is necessary to continue this research.

7. Besides the research on inertial drives, the author made some investigations on correctness of Einstein's special relativity principle. Instead of the known Newton's experiment with a pail of water, the author made an experiment with rotating de-balances. Results showed that relativity principle is questionable, since the motionless body and the moving body in the gravitational field are in different conditions. Reliable results can be obtained in the simplest experiment for the cases of even rectilinear motion of the transport and motionless transport.

### Practical Application of Inertial Drives

Inertial drives for space apparatus can be applied both for long distance space flights and for satellites, or for the space stations. For satellites it allows to increase the period of operation on the orbit. Fuel is saved and ozone of the planet is not demolished in this case. Active drives can be used as a personal haversack propulsion drive of a spaceman and in future as a drive to correct the orbit of the space stations. Also inertial drives can be used in ground transport for North region or for desert regions since the high velocity is not required for these cases.

### Conclusion

Inertial drive is not a single way to create non-reactive space propulsion. Magnetic and electrical fields can be used for motion in space also. Earth have magnetic field, so Lorenz forces can be used to create repulsion from the Earth magnetic field even in the area of orbital space. There is a question: are Lorenz forces sufficient for practical application in this case.

Besides, it is necessary to develop R.G.Sigalov's research [16] to create **space propulsion drive by means**



## of non-linear elements of electric currents in metal conductors, which are bent at some angle.

A valuable information about antigravitational device according to Ph.D. Dokutchaev V.T., was published in 1989[17]. This device had weight less than one gram and it used electromagnetic waves to create propulsion force of about a milligram. It is not the limit for the devices of such type, and a more powerful result can be created. *(Editor's: See the above article "Design of an Engine for Free Space based on the Pondemotor Effect" by Acad. Gennady F. Ignatyev, who got a propulsion force about 60 N, i.e. equivalent to 6 kg-force).*

Space has different reaction on translational motion and rotational motion. Gyroscopes use this property. Member of Byelorussian Academy of Science, Albert I. Veinik discovered these effects during his experiments.

Prof. Kaznacheev made an analogous experiment using the rotating gyroscope and he explained weight changes as a result of the inner lifting force [18].

There are a number of proofs on possibility to create the reactionless space propulsion drive. This problem requires a serious State research program.

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## Experimental Investigations Based on the Model of Electromagnetic Solitary Waves (Solitons)

(It is published here in short version)



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Using transceiver of electromagnetic solitary waves [1] and mathematical idea on the nature of electromagnetic (EM) solitary waves (solitons) [9] there were made experimental attempts to find interaction of artificially generated EM solitary waves and natural formations, which contain the same solitary waves. To do this the experiments on influence of EM solitary waves radiation on objects, which have various nature, were made, in particular, on biological processes and biophysical

objects (processes of bioplast fission and neurostructure of brain and others), on ultrahigh frequency plasma, on the process of atomic nucleus decay as well as gravitation. In all of them **we found specifically soliton effects**, which were due to the fact that the mentioned effects and processes contained **coherent spiral structures**. These structures were stipulated by the presence of multilinked (many-sheeted) EM solitary waves.

For example, an effective influence of EM solitary waves was observed on the following biological objects. Growth of food barm in solution of honey kvass increased two times (in comparison with process in standard solution) during radiation by solitary waves of positive polarization (by electromagnetic component). It was made by two transmitting magnetic antennas (MA) shifted relatively each other at 90-degree and 90-degree phase delay. The same barm slowed their reproduction during radiation by solitary waves of negative polarization. Obviously, such effect is related with the change of spiralization threshold. Change of this threshold stimulates the excitation of electron-vibron field (it is some component of triune field of many-sheeted EM solitary wave). At that electromagnetic component of EM solitary wave field (biofield) was observed before as luminescent filaments of mitogenetic (ultraviolet) radiation for process of the cell fission.

In another experiment a single (for the time of less than 1 second) radiation by EM solitary waves on simple

# Technical Design of Antigravitational Spacecraft “Silver Cup”

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## Introduction

Kinematical schemes of known vehicles are very simple. Weight of an automobile increases frictional force and creates cohesion of wheels with the road. Due to the transmission of rotation from the engine to wheels the automobile moves along the road. The road serves as a fulcrum to the automobile.

A helicopter repulses from air by its fan baffles, it allows the helicopter to move upright. Air serves as a fulcrum to the helicopter.

Due to the convex form of airplane wings the reduced pressure appears above the wing with incoming airflow. This pressure overpowers the gravity of the airplane mass. The incoming airflow serves as a fulcrum to the airplane.

***Editor's: it is a very simplified view and it can not be considered as fully correct idea.***

A rocket flies due to reactive gas flow. Similarly it is possible to move repelling water. A combination of rocket and airplane led to the creation of jet airplane.

The power antigravitational spacecraft that I'll speak about repulses from it using the strongest force in Nature, i.e. the so-called “released force”. I especially exaggeratedly showed how simple are the kinematical schemes of movement of the known vehicles. All they are usual for us and we do not notice them and we are not surprised. But let's remember, how did the first automobiles look and how do they look now? Thus, do not be surprised that kinematical schemes of movement of my antigravitational spacecrafts are very simple too. Besides, they are not perfect, because this cause is a new one. It is a business for designers to make them perfect. But in any case my antigravitational spacecraft is a great step forward in the development of transport techniques.

## Some explanation

Do you know, if anybody ever asked himself why do material UFO apparatus being in our material world easily elude the pursuit of rockets and military aircraft, which work at the maximum power of their engines? According to UFO literature, the extraterrestrial apparatus sometimes “laughing” at the imperfection of the earth flying techniques. They can sharply increase

their speed and disappear far away, then they can return. Looking on such “maneuvers” and other “wonders” like flights at straight angles on a high speed, everyone have an impression that these objects are not material, since such a “flight” contraries to people's conceptions about motion.

As numerous eyewitnesses stated that UFO are material and some people touched them or visited these objects, then various fantastic hypotheses appear on this basis that extraterrestrial can control space and time during their flights, neutralize gravitation, etc. But is it true?

If we believe these eyewitnesses and base on the theory that extraterrestrial's apparatus are material, then according to physics we should consume power, energy to move a mass from the point A to the point B. This mass cannot move immediately from one point of space to another without any energy consumption, otherwise it will be in contradiction with the law of conservation of energy and common sense. We can ask then, what kind of engines do extraterrestrial have, which can move their apparatus with such a high speed from one point of space to another? These systems are much better in acceleration and speed of flight, than all our kinds of flying techniques.

You can say that extraterrestrial can use some fields of unknown nature to move their UFO systems. Yes, they can, but are these fields really unknown to our science? And may be it's not a problem for us to use them also. Any field unknown to science should create the force of ordered action, i.e. traction to move a mass. Sometimes a usual spring can create higher traction than any unknown field!

I'd like to underline that we should not advance any fantastic theories. If UFO systems can move with such a high speed, then they have the corresponding superpower engines. There is no another explanation in our real World. You can find and understand the principle of operation of these super-power engines. *Editor's: we have already mentioned the simplifications made by the author to present these complex scientific ideas in a popular view. So, we ask our readers to be indulgent to this style of narration.*

Also there is one more prevalent opinion that extraterrestrial learned to neutralize gravitation to make their large-tonnage systems weightless. This vague statement sounds beautiful, but when we begin to think about neutralization in a physical sense and how can we neutralize gravitation taking into account gravitational properties of atom, then we will find out that gravitation can be neutralized only by static repulsion, by charge of another sign, i.e. using opposite directed force. There is no another possibility.

*Editor's: we believe, that the author is limited by consideration of his original idea only and other ideas are not possible from his point of view. Sure, we cannot agree with him in this point.*

It means that we should spend energy anyway to neutralize attraction force of large-tonnage mass of the system. This leads to the fact that any system should overpower gravitation force, make an antigravitational action, i.e. it should be an antigravitational spacecraft.

But even this scheme to neutralize gravitation, which was described here, can be simplified and improved by means of creation of a static flight, which is also known to me. My colleague from Latvia Alexander studies this method of flight. The system (theoretically developed by Alexander) radically differs from Searl's system.

*Editors: See S. M. Godin and V. V. Roschin works on creation of Searl's generator. The change of weight was about 100 kg.*

It is simple in design and production, lighter and much more powerful than Searl's system, because it creates the difference of potentials between the body and environment. It attracts energy from environment by whole external surface of the system, then makes repolarization and repulses it like rocket does. The power of the system can be higher due to the big square of surface, which attracts energy. Alexander knows problems of heavy systems made by John Searl as well as those made by Roschin and Godin. With their design scheme they will not achieve Alexander's results. But he also has problems, for example, to get and make composite materials with necessary properties. He knows these properties, but he has no research laboratory to study them. It is a main complexity in his occupation. Without this problem he could create a small static system.

I think that the main imperfection of systems, which use only static flight for movement, will be bad maneuverability and impossibility to start immediately in the case of danger. Also the imperfection of static antigravitational spacecraft is the fact that designers of these systems are limited due to the physical principle of operation. So, they will not be able to create systems of different shapes. We should note that maneuverability of static systems is small.

I can say that static method of flight by Alexander called energoplane, had been already considered in the history of Science, but I should mention that it was not developed up to industry level. Alexander on the base of his numerous experiments got better results in his method of flight. A demonstrational prototype (cart) designed by him moved being attracted to environment only. It is a matter of "techniques" now to create a flying static system. Alexander called his static system "Electrical lens", which collects, focuses energy in itself.

These two methods of flight, force and electrostatic, are different from each other by their method of work. Static method needs environment to make its engine work and move the system. Force system does not need environment to make the engine work. It needs environment only to move the system, because it can store energy for its engine inside the system as well as

it can take it from environment by static method or using a generator.

To be unbiased, I should say that the main advantage of the static flight to the force flight lies in the fact that static flight takes energy for the movement directly from environment and there is no need to store it. It substantially decreases the weight of the system. Energy in environment is infinite. It means that static systems can fly "perpetually" that is very important during long intergalactic flights.

I see the future in combination of both methods of flight in one system.

### **Explanation**

When a gun shoots, then gases released from the case push the shell forward and mass of the gun is pushed back. If all people know about the recoil force of the gun, then only some physicists know about "released force".

Let's imagine that the mass of the gun is 1 ton and the mass of the shell is 10 kg. If we shoot from this gun and place imaginary scales on some distance from it, then the power of blow of armor-piercing shell upon this scales will be about 20 tons or more. The opposite scales will register that recoil force will be of 1 ton. Here you can see the disproportion of forces!

If we fasten an imaginary elastic line between the gun and the shell, then the released force according to resultant of forces will overpower all other forces (mass of the gun, recoil force and frictional force). From this example we can see that the shell will carry off the gun due to its movement. If we place the gun upright and shoot from it upwards, then the shell also will carry it. And such a system consists of two uncoordinated masses, the gun and the shell, which are not tied together, will fly upwards.

*Editor's: Really, it is true only if there are different momentums  $p=mv$  for the gun and the shell!*

Direction of movement as it is known takes place towards the bigger resultant force. Every inventor has its own "language of physics", because the usual one does not allow him to create. I introduced my own language and should make it understandable. As I see it, kinetic energy is a "released energy" and potential energy is a "stored force". If we consider physical phenomena only from the position of energy, we will not be able to understand the entire pattern of reality, since many physical phenomena cannot be explained only from positions of energy structure of the World. And as I see it, such position is comparable with a special case in physics. But we can explain everything from the position of force, all structure of the World on micro and macro levels. The World is very simple, and people created complexities in its explanation themselves, due to the lack of knowledge. That's why further I will adhere to my own language in physics as a simple and popular one. I think it will be a language for future physics! It is

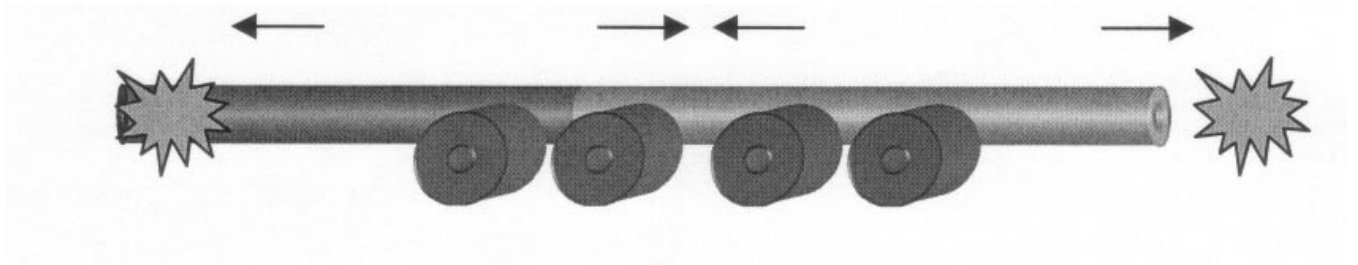
not necessary to give scientific mathematical solutions when they have no common with the physical reality.

One can say that the system considered above can fly up in such a way only for one time, and then it will drop to the Earth, because there is no fulcrum!

Surely? And who will prevent you from further "shooting" when you fly upwards? You can shoot with certain frequency, time and pulsation. And are you sure that there is no fulcrum? Being repulsing from the body, the moving mass starts acceleration, and then it

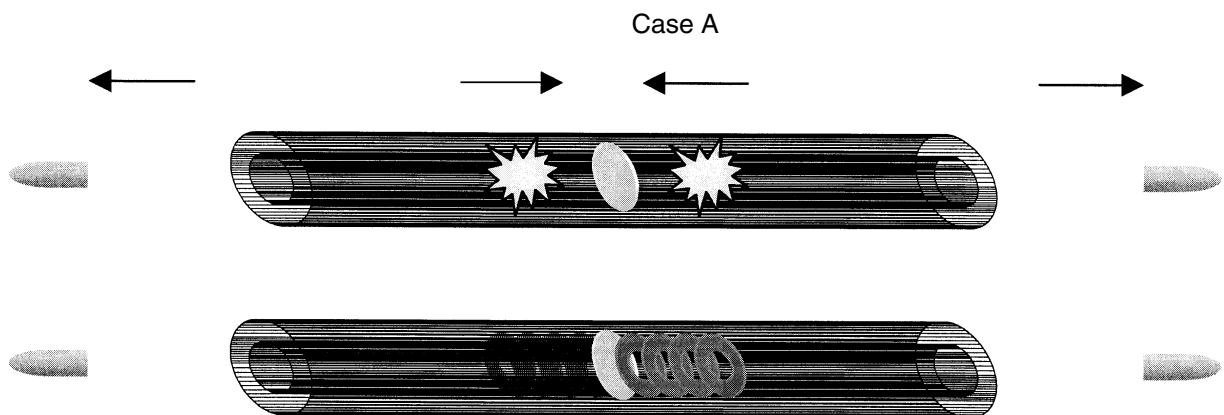
increases speed (increases its force also) and carries the body upwards. *Editor's: In this case we periodically create a fulcrum. In some works it is called "dynamical support".* Or may be it's better for you to push using diffused gases like a rocket does, than to have a stable fulcrum? We can decrease recoil force of any of masses by various technical methods, we can remove or use recoil force to fly upwards! I know how to do it...

Further let's imagine two guns placed one opposite to another as it is shown on the Fig. 1, which shoot synchronously. What will happen to them during shots?



During the shot, recoil forces of two guns will be mutually compensated and there will be no recoil! This example also shows how we can eliminate recoil force by the force equal in weight, but opposite in direction of action. We can mentally remove backs of guns and during the synchronous shot released gases will push cases of shells backwards, which will mutually repulse and will be fulcrums to each other.

Then let's consider what will happen to the same metal tube bent at different angles. To compare them we will simultaneously consider what will happen inside this tube with mechanical variant of release of force using springs, which repulse the mass. We can also push the mass using pressure, pneumatics, electromagnets, etc. You know, all phenomena in nature are similar by the action of force they made.



The "released force" in both variants, explosive and mechanical, will not get the tube moving forward. The force of pressure or stored force of spring will repulse from their fulcrums and will push cannon balls forward. Here is a classic case; the action is equal to counteraction.

In this variant the "released force" will act on the tube and will call a small reactive effect. The "released force" of gases will go in one direction, and recoil force of these gases will push the tube in the opposite direction like a rocket.

Case B.

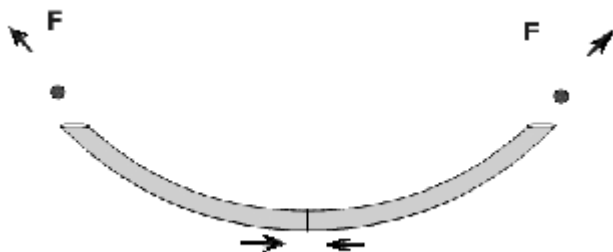


In mechanical variant with springs the reactive effect will be less, and it can be so small that it will not be able to get the tube moving forward. It takes place due to the changed direction of force to the fulcrum as a result of bent tube. In this variant two springs have their inner fulcrum, from which this springs repulse and push masses. It also assumes the inner recoil force of both springs is mutually compensated. I.e. there is no recoil force! May be, there is an outer recoil force, which is a reactive effect. But the value of reactive effect and frictional force cannot be compared with the value of "released force"!

The essence of reactive movement is based on the fact that one mass moves in one direction and another moves in the opposite direction. Every mass serves as a fulcrum to another one, from which it repulses. It cannot be any movement of the mass without the presence of another mass. The only problem is: what mass we should consider as a fulcrum. It can be the rocket or gases, but all things are relative. Usually we consider the mass, which has more force, mass and solidity to be the fulcrum. Another mass can repulse from it and then move. Not in vain we say that the rocket repulses from its gases, which serve as a fulcrum to it. We only understand that released gases serve as a fulcrum to the rocket and it flies due to recoil force repulsing from these gases. If the rocket uses released force, but not throw it away like a useless one, then it will be a "force antigravitational spacecraft"! Or it can be an automobile without a drive to its wheels that is a horizontal flight of antigravitational spacecraft.

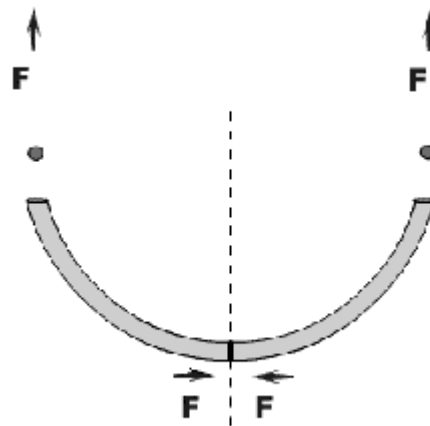
Besides some inventors make horizontal inertoids to move without a drive to wheels, by means of flywheels, disbalances and other rotary and impact mechanisms as well as they decrease the weight of vertical inertoids. Sometimes they do not understand the main aspect that is why they create movement or decrease weight. It's very simple; they all use the "released force" or some percent of it. Movement can be created due to this force as well as decrease of weight of their systems. Other forces are not able to do it. If we understand it, then we will easily get 100% of this force.

Case C



The "released force" will act on the tube in a greater extent due to the greater convolution of the tube and it will throw away the tube by its recoil force. It will call the bigger reactive effect. I have already spoken about it.

Case D



It is obvious that reactive effect is expressed in a greater extent due to the big convolution of the tube. This method of movement is used by rockets, which throw away the released mass of gas by its engine.

***The conclusion is: If we look on these examples, we will see that the smaller the force of reactive effect will be, the bigger efficiency will be obtained by the released force.***

Now if we mentally fix an elastic line between flying cannon balls and the tube, then cannon balls will push the tube. Here everything depends on the power of shot, i.e. on the stored force, which was stored by the spring. If there was enough force, then during the release of force, accelerating cannon balls will overpower the counteraction, attraction of mass and force of the tube and frictional force, thus this mental system will fly.

Cannon balls will act on the inner walls of the tube due to the changed trajectory of their movement and will call reactive effect, i.e. the recoil of the tube backwards. Much depends on the convolution of the tube, the value of power of reactive effect also depends on it. But this value of power cannot be comparable with the force of release.

*Editors: Here the author writes about another method, which is described by the formula  $F=ma$  for nonlinear motion. In my opinion, exactly this method will be more perspective for future spacecrafts.*

Further we will keep improving this tube and will start the immediate designing of the force antigravitational spacecraft.

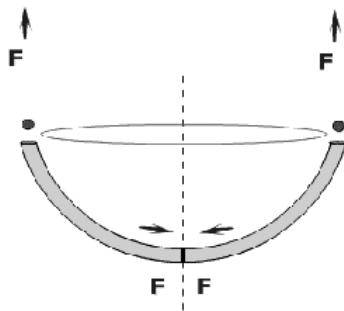
#### **Model of Antigravitational spacecraft "Silver Cup"**

The flying cannon balls can carry off the tube and it is a fact of a flight! Then we can place several pairs of such tubes and join them crosswise. We can extend them with some engine and periodically shoot with certain frequency. And such design will also fly away due to its bigger power. The main problem is that this unusual

engine should be able to store the power for a new push in the moment when it flies upright upwards.

*Editor's: this is the weakest aspect of the author's theory, which does not consider the return move of the "ball" to the initial point.*

Let's keep on improving the system. We can join the balls-masses flying upwards between each other during the synchronous shot. Then we can put some covering on these connections and make some kind of a round floor. But now it is only a "raw" mechanical variant, which is difficult to make in techniques. It's a draft for kinematical structure of a system of new generation. We can do it simpler and much more powerful.

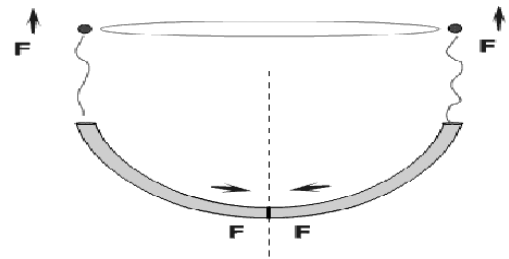
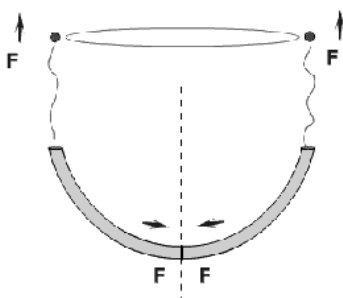


### Technical structure of the antigravitational spacecraft "Silver Cup"

If we consider the upper figure, we will see that the system consists of two separate parts, masses, which do not have a rigid connection. They are connected by springs, shock absorbers, spades and similar things placed along the circumference of the system.

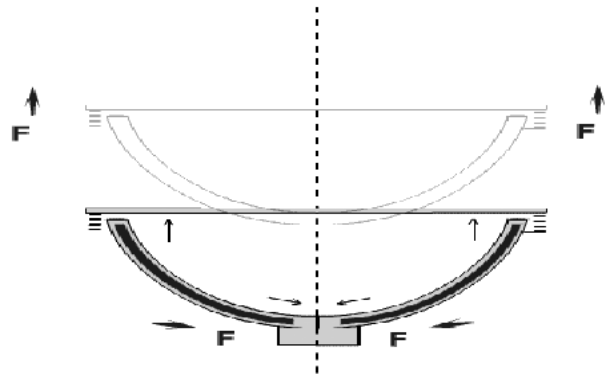
As I wrote above, the engine can be different (explosive, pneumatic, electrical, etc.). During the force release, for example, by explosive engine, the mass 2 will repulse from the inner fulcrum, i.e. from the mass 1. It will fly away pushed by explosive force like a shell (1500 m/sec). Since the mass 2 is tied with the mass 1 by the loose coupling, the mass 2 will involve the mass 1 to the flight. The main problem is that the force of upward movement of the mass 2 should overpower attractive force of the mass 1. I.e. the value of released force or explosive force should be always higher than the total weight of all system. Only in this case the flight can take place.

Many will depend on the convolution of tubes (!) and on the length of barrels, in which the shells-pistons are



placed. These shells also need time for acceleration, to pick up force and overpower the reverse action of another mass. The role of shock absorbers is to carry the second mass and to cushion the power of impact.

In the explosive variant of engine (in contrast to other variants) there is a problem, what to do with waste gases. We can entrain them in the work of engine converting them to another aggregate state or to throw them away like a rocket does through some exhaust valve working in the same clock cycle with the engine.



But I should advise to all: Let's follow the way of released force created inside the system, but not the collision way, then the flight will be silent and noiseless. The mass should carry another mass, but not strike mass against mass. During the long flight by collision method no metal can stand it for a long time. Horizontal flight in this model can be made in such a way: It will be enough to place the same bent tubes under the floor. The other things are easy to find. Please, note that the antigravitational spacecraft is empty inside. And every body that enters it can ask a question: Where is the engine? Since all are accustomed to the traditional position of engine. The engine of the given model of force antigravitational spacecraft is situated under the floor, and the lower part of the body.

### Conclusion

Many people can ask a question, why I wrote this paper? The first reason is the unbelief of people that it is possible to create an antigravitational spacecraft like aliens have. The second reason is that I have been working all this years during whole days for you and without any salary, only for humankind evolution. Thirdly, taking into account the importance of this discovery for Humankind, I'd like people to fly to stars in the near future. I want to organize a foundation to develop this technology.



**solenoidal, herewith it is forgotten, that poles of the magnet can be oriented not only along the direction of motion, but across also.**

From the electrodynamics textbook: "The vortex electric field differs from electrostatic field that it is not related with any electric charges and its lines of intensity are closed lines."

**From theory and from experiments it follows, that under transverse motion of magnet the lines of disturbance of vortex electric field can be unclosed and, accordingly, the flow of induction through the closed surface is not a zero. Then there is a direct discrepancy to facts in modern electrodynamics.** It is strange, but for the whole history of researches in magnetism the transverse magnet's motion was not considered. It leads to revising of electrodynamics' postulates, which plays such role in electrodynamics, as the Newton's laws plays in classical mechanics. The postulates, giving invalid belief about field processes, accordingly, do not allow to make some correct calculations. Fallaciousness of these postulates was one of the reasons, on which the electrodynamics could not to consider and to calculate the discrete electromagnetic waves (photons), where the magnetic field also is the transverse field (the field construction and calculation of photons are represented on the page <http://www.comail.ru/~alemanov>). **That is to say, not only particles has the charges, but areas of disturbance of field (without particles) are the charges also,** where the flow of electric induction through the closed surface is not a zero. Thereby, the vortex electric fields can be not only as closed flows of induction, but as well as inducted electric charges, accordingly, the laws for electric charges are valid for induced electric charges also. For instance, in the law of conservation of charge: if somewhere the area of disturbance with positive sign appears, that negative area appears also.

From the electrodynamics textbook: "The vortex electric field is generated by the variable magnetic field. Its force

lines are always closed, like force lines of magnetic field."

But before this fundamental postulate, confirming, that force lines of vortex electric field are always closed, it was necessary to consider all variants of change for the magnetic field, including the variant of the transverse motion of the magnet. That is to say, the consideration of physical processes could not be unilateral. Faraday considered the longitudinal motion of magnet and discovered the electromagnetic induction, but the transverse motion of magnet that have the principle importance for understanding of field processes in electrodynamics was not considered. Thereby, the longitudinal motion of magnet brings to arising a vortex electric field with closed force lines, but transverse motion of magnet brings to arising a vortex electric field, where the lines of forces are not closed. In this case it lead to induced electric charges. It is necessary to notice, that this is first mistake, detected in electrodynamics postulates for all time of existence of electrodynamics.

From the electrodynamics textbooks: "...Gauss' theorem is valid not only for electrostatics, but also for electrodynamics, which using a variable in time electromagnetic fields. We are not sure if this hypothesis is valid or it is not valid... Only the experiment can give the answer on this question. The whole collection of experimental facts speaks in favor of this hypothesis." But, unfortunately, the experiment with transverse motion of magnet was not considered seriously in this textbook.

***(Editor's note: Well-known Searl's experiments and Godin & Roshchin's experiments are based on such transverse motion of magnets (rollers). In Alemanov's article it was demonstrated that in this case the experiment should lead to induced electric charges. Really it was detected in experiments. Hence this missed aspect of electrodynamics is very important for development of the new energy technologies.)***

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## Gravito-Inert Mass

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Nature of mass is one of the important problems of modern physics. It is accepted to consider that the mass of elementary particle is determined by fields, which are connected with it (electromagnetic, nuclear and others). However, we didn't create any quantitative theory of mass. There is no theory to explain why masses of elementary particles form a discrete spectrum of values and to allow determining this spectrum.

Mass ( $m$ ) is a physical value, one of characteristics of matter, which defines its inert and gravitational properties. Accordingly, we distinguish inert mass ( $m_i$ ) and gravitational mass ( $m_g$ ).

Inert mass ( $m_i$ ) characterizes dynamical properties of a body, its property to accelerate under the action of the force ( $\vec{F}_i$ ) and according to the second Newton's law is considered to be constant coefficient of proportionality for the given body between  $\vec{F}$  and acceleration  $\vec{a}$ .

$$\vec{F}_i = m_i \vec{a} \quad (1)$$

Gravitational mass ( $m_g$ ) is a source of gravity field. Every body creates its gravity field, which is

proportional to the mass of the body. This field initiates an attraction of any other body to the given one with a force determined by Newton's law of gravity:

$$F_H = \sigma_H \frac{Mm_g}{r^2} \quad (2)$$

where  $r$  is the distance between bodies,  $\delta_H$  the universal gravitational constant,  $M$  and  $m_g$  are the masses of attracting bodies.

In principle, it follows from nothing that the mass ( $m_g$ ), which creates gravity field, defines inertia of the same body ( $m_i$ ). However, the experiment made before the creation of relativity theory showed that inert and gravitational masses are equal to each other:

$$m_i = m_g \quad (3)$$

This law was considered to be fundamental law of nature called "the principle of mass equivalence" and was a basis for general theory of relativity (GTR) by A. Einstein.

According to general physical theory of a universal field (GPTUF) by Kadyrov [1] the mass usually observed ( $m_{obs}$ ) consists of the mass immovable regarding to the selected inert frame (IF) of particle ( $m$ ) and mass, which depends on rate of movement of particle ( $m_i$ ):

$$m_{obs} = m + m_i \quad (4)$$

Kadyrov called the mass  $m_i$  «inert mass», but it is not the mass  $m_i$  in (1), which is called in the same way. That's why to prevent the mishmash with  $m_i$  in (4) further we will call "gravito-inert mass" and will indicate it as  $m_{gi}$  that will be a correct reflection of physical sense of this mass.

Mass  $m$  in (4) expresses the same mass as in (2), and then we will rewrite the formula (4) as

$$m_{obs} = m_g + m_{gi} \quad (5)$$

where

$$m_{gi} = m_g \cdot \frac{v^2}{c^2} \quad (6)$$

Developing these Kadyrov's laws we will show the change of mass  $m_{obs}$  with the change of speed of particle. Experiments made after the creation of GTR showed the dependence of acceleration of gravity on the chemical composition of bodies. The body, which weight is more, falls to the Earth slower then the body of smaller weight, since there are more protons and neutrons in atoms of heavy bodies. These protons and neutrons antigravitate with protons and neutrons of the Earth. According to Kadyrov a mutual repulsion appears between similar particles (i.e. antigravitation) and attraction appears between any two dissimilar particles. Such interaction takes place independently,

whether a particle has electrical charge or not. Every elementary particle has gravitational charge, which is proportional to its mass ( $m$ ) according to Kadyrov's formula

$$q = \pm \sqrt{\sigma_H} \cdot m \quad (7)$$

where  $q$  is a gravitational charge of the particle.

In result we get that gravity acceleration depends on the speed of bodies according to Kadyrov's formula

$$g = g_H \left(1 + \frac{v^2}{c^2}\right) \quad (8)$$

where  $g_H$  is determined from (2) according to the following formula:

$$g_H = \frac{\sigma_H M}{r^2} \quad (9)$$

and we will call it "Newtonian gravity acceleration".

***As a result the principle of equivalence is not true and the foundation of GTR is broken.***

Let's rewrite (2) taking into account (9) as

$$F_H = m_g \cdot g_H \quad (10)$$

The mass  $m_i$  in (1) is the mass  $m_{obs}$  in (5), which is determined taking into account (6) as follows:

$$m_{obs} = m_g \cdot \left(1 + \frac{v^2}{c^2}\right) \quad (11)$$

Dependence of  $m_{obs}(v)$  is presented on the Fig. 1 according to the Table 1:

Table 1

$\frac{m_{obs}}{m_g}$	$\frac{v}{c}$	$\frac{v^2}{c^2}$	$\frac{F_i}{F_H}$
1	0	0	$a_i/g_H$
1,04	0,2	0,04	$1,04 a_i/g_H$
1,16	0,4	0,16	$1,16 a_i/g_H$
1,36	0,6	0,36	$1,36 a_i/g_H$
1,64	0,8	0,64	$1,64 a_i/g_H$
2,0	1,0	1,0	$2 a_i/g_H$

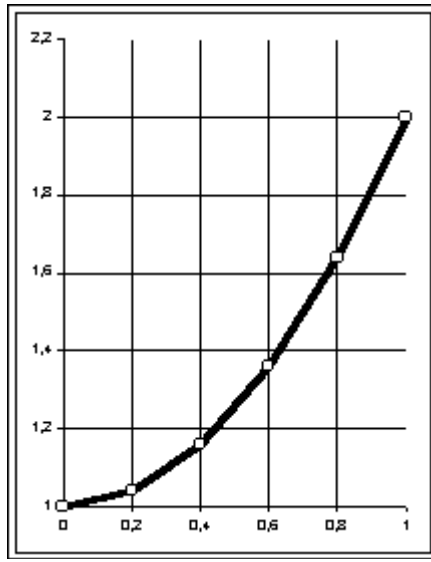


Fig. 1 Dependence of mass on speed

**Note:**  $\frac{m_{obs}}{m_g}$  is laid off by OY axis and  $\frac{v}{c}$  is laid off by OX axis.

The observed mass ( $m_{obs}$ ) grows with the growth of speed of the particle until it will be double to its initial mass, which corresponds to rest mass state ( $m_g$ ). With achieving of top speed ( $v=c$ ) the particle gives birth to antiparticle. Antiparticle has the same mass as particle.

According to GPTUF by Kadyrov [1,2,3], the ravitational charge (7) does not differ from electrical charge on the boundary of quantum volume of the particle, i.e.

$$\pm q = \pm e = \pm \sqrt{\sigma_H} \cdot m_{obs}$$

and if we will take into account (11), then we will get

$$\pm e = \pm e_0 \mp \Delta e \quad (12)$$

and with  $v=c$ , then

$$\pm e = \pm 2e_0 \quad (13)$$

where  $e_0$  is the charge of particle in immovable state,

$$\Delta e = e_0 \cdot \frac{v^2}{c^2}, \quad e_0 = \sqrt{\sigma_H} \cdot m_g$$

If we take into account (11), then the force  $F_i$  will be equal to:

$$F_i = m_g \left(1 + \frac{v^2}{c^2}\right) a \quad (14)$$

or 
$$F_i = m_g a + m_{gi} a \quad (15)$$

If we will take a ratio of (14) to (10), then we will get that  $F_i \neq F_H$ , namely

$$\frac{F_i}{F_H} = \frac{a}{g_H} \cdot \left(1 + \frac{v^2}{c^2}\right) \quad (16)$$

this implies with  $v=0$

$$\frac{F_{i1}}{F_H} = \frac{a_1}{g_H} \quad (17)$$

at the same time from (11)  $m_{obs} = m_g$ , and with  $v=c$

$$\frac{F_{i2}}{F_H} = \frac{2a_1}{g_H} \quad (18)$$

in this case from (11)  $m_{obs} = 2m_g$  (19)

**According to (19) when speed of the particle is equal to the speed  $c$ , a new identical particle is formed from gravito-inertial field of the particle.**

This particle has a spin opposite to the moving particle. Appearance of electron-positron pair is possible as a result of accelerated motion of electron. In general case the mass  $m_{obs}$  of the particle increases according to (11), i.e. the more the speed of the particle, the rapidly  $m_{gi}$  increases.

According to (17) and (18) with  $v=c$  the force  $F_{i2}$  will be double in its value, and the force equal to  $F_{i1}$  will act on every particle. It means that two particles will fall back to the Earth.

Let's allow that electron ( $e$ ) with the mass  $m_e$  accelerates from the Earth athwart to its surface. Its mass increases due to its gravito-inert mass, which will cover and compress the initial mass. Gravito-inert mass can be constantly emitted as photons. This fact explains the emanation by Vavilov-Cherenkov during the movement of charged particles. While reaching of  $v=c$ , the antiparticle of electron is born (positron) and they fall back to the Earth. Possibly, it explains the avalanche of electron-positron pairs, which regard to the secondary space beams. With the acceleration of proton up to  $v=c$  an antiproton should appear, and with acceleration of neutron an antineutron should appear. **Thus, no particle can fly out of our Universal, i.e. it is a black hole.** An antiparticle appears from the field and when it meets with a correspondent particle, they turn to the field. This field is unified, it is a gravitational field, and electromagnetic and nuclear fields are various manifestations of it.

According to Kadyrov [1,2,3], particles (electron, proton, and photon) are self-rotating clots of gravitational field, they have a dense nucleus in the center, and layers move around this nucleus with de Broglie's frequency. With

this movement their masses increase according to (11). This increase takes place because the mass of the field of particle, which is called "gravito-inert mass", increases. With a top speed ( $v=c$ ) an antiparticle appears from it. But antiparticle is the same formation as a common particle, but its spins are opposite to spines of common particles. Gravito-inert mass is a mass of magnetic field of particle. Kinetic energy of

magnetic field is equal to  $m_{gi} \frac{v^2}{2}$  and when it becomes

equal to  $m_g c^2$ , then a new antiparticle will form from this magnetic field, i.e. with energy of  $m_{gi} v^2 = 2m_g c^2$ .

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# On the Eve of the Sixth Revolution in Physics

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## Condition of modern theoretical physics and the ways of its development

### **Methodological crisis in modern theoretical physics.**

Modern physics achieved outstanding results in the field of cognition of laws of nature and in many applied fields. The twentieth century is characterized with such great achievements as splitting of nucleus and creation of atomic energy on this base, creation of quantum generators, discovery of astronomic objects with unexpected properties, research of properties of "elementary particles" of the matter and many others. Absolutely new directions of natural science appeared, which not only solved many theoretical problems, but also put them to serve the all mankind.

However, in spite of this, it becomes more evident, that in some fundamental fields of natural science, first of all in theoretical physics, some contradictions appeared and they keep on accumulating. They are nicely named as "divergences", which have the fundamental character and which are the serious hindrance of further development of fundamental and applied science.

The numerous attempts to combine the basic fundamental interactions on the base of conceptions existing in modern physics turned out to be practically unsuccessful. The amount of opened "elementary particles" of matter does not correlate with the full uncertainty of their structure. Energy of radiation of the stars including the Sun is not explained because its radiation shall wear out long ago taking into consideration the time. Even in such a developed field as electrodynamics we have the whole classes of problems, which cannot be solved in the frames of

existing theory. For example with the movement of two similar charges a paradox appears: quiet similar charges should repel from each other by the law of Coulomb, but they attract each other because they are the currents. If they are still immovable in relation to each other, then why do they attracting in the movement?

In spite of many public appearances, statements and popular and special articles having the aim to prove the greatness of modern physics and great possibilities, which are waiting for the mankind in relation with its achievements, we should state that there is no anything similar in reality. There are a series of contradictions, so called "paradoxes" in physics; some of its theses became discrepant with the theses of dialectical materialism. For example, the idea of "Big explosion" is in contradiction to the thesis of dialectical materialism about the absence of origin, birth or creation of the Universe. But some theorists suppose that dialectical materialism should be corrected because some parts of it are in contradiction with the universally recognized theories in physics, for example with the relativity theory.

In the applied physics different promises do not realize nevertheless. Many years passed from the moment when the "stable plasma" was created and existed for 0,01 second. Since then the numerous units were constructed to get a thermonuclear energy, which should provide the mankind with the energy. However the units exist, institutes and plants were built for this purpose, conferences and meetings are hold, awards and academic degrees are given... The only problem is: we have no thermonuclear energy itself, and nobody knows if it will ever appear.

We have spoken a lot and for a long time about STR – scientific and technical revolution, about achievements of science; the nuclear weapon and nuclear power were created, the flights into the close space were organized, the numerous materials were developed, computers of high complexity, robots and other things were created, and so on. However with all this we should state that the quantity of new discoveries decreases and development has a quantitative character, and even with the studying of "elementary particles" of the

each other, but they have equal Poynting vector  $P$ , and place them coaxially then ether will move asymmetrically according to law of conservation of the quantity of the motion, and the result for it is the propulsion force  $F_t$ .

At the present time the third model of the fragment of the engine was built and its main technical parameters were measured. So, on the frequency of 80 kHz we measured that the electric intensity is  $E=10^5$  V/m, the total electric intensity is  $E=10^6$  V/m, the magnetic intensity is  $H=2 \times 10^4$  A/m, the Poynting's vector is  $P=10^{10}$  Joule/( $m^2 \times s$ ), the propulsion force is  $F=60$  N (about 6 kg-force) if the input power to one LC circuit of the system is about 10 kW. The system is shown on the photo.

In the near future will start experiments on engines based on the "pondemotor effect": measurement of rotation moment, interaction between the exciter and its mirror reflection from the Earth surface and so on. We started to design a fragment of the engine with radius  $R=40$  m, which will create  $P=10^{14}$  Joule/( $m^2 \times s$ ) and  $F_t=3 \times 10^4$  N (about 3 tons).

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# Propulsion From Relativity Effect of Inertial Force

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**Many scientists challenged to get propulsion from inertial force. No one succeeded. Here we show the possibility of propulsion system by the effect of relativity of inertial force. Activity matter may be a gravitational wave or "space-time". We named it "space-time propeller". If we success to show that the system will work, then we will get a propulsion from electric power.**

The system consists of a turntable and 2 wheels. Wheels were set on the edge of this turntable. We call it "space time propeller ". Proper time at point P in wheels will be delayed by rotation of turntable and wheels. This delay depends on the position in the wheels. Delay describes as follows, if we neglect the effect of own mass of wheels. We do not need to think about mass of the turntable. The " $\tau$ " is proper time on P. The " $t$ " is the time at the inertia system fixed on the center of a turntable.

$$d\tau = \gamma dt \quad (1)$$

$$\gamma = \frac{1}{\sqrt{1 - \frac{r^2 \omega^2}{c^2} - \frac{R^2 \Omega^2}{c^2} - \frac{r^2 \Omega^2 \cos^2 \varphi}{c^2} + \frac{2rR\omega\Omega \sin \varphi}{c^2}}} \quad (2)$$

In general the "inertial force field in the accelerated coordinate system" is in inverse proportion to proper time of each point.

$$\text{inertial force field} = -\frac{dx_\mu}{d\tau} \quad (3)$$

In the case of the space-time propeller, the sum of inertial forces on each point of wheels is not equal to zero.

It means that all the sum of inertial forces in wheels is never canceled. It is a "relativity effect". We call this phenomenon the "inertial force deviation".

**Non-compensated inertial force =**

$$= \int_{\text{Volume of all Wheel}} -\frac{dx_\mu}{d\tau} dm \neq 0 \quad (4)$$

The new propulsion force is just a non-compensated inertial force. If we put plus spin on the turntable and minus spin on wheels, we can get directed propulsion.

**How many propulsion we can get? We can get 70,000 N propulsion under the following condition. The radius of the turntable and wheels is 1m; linear density of wheels is 10Kg/m, frequency of rotation of turntable and wheels is 16,000 Hz.**

The idea of the space-time propeller includes 2 problems. The first one is that we used a rigid body in above discussion. But any terms will not be divergent under the condition that  $\lambda$  in (2) is real. Therefore we can avoid the physical failure in above discussion. The second one is that active matter is unknown. According to above discussion, we can't explain energy-momentum conservation.

We should find an active matter to explain the energy-momentum exchange mechanism. It is natural to think that the active matter is the gravitational wave. It means that the space-time propeller "kicks" the space time like the propeller kicks the air.

To explain that active matter is a gravitational wave, we need to know the structure of space-time inside of

the rotating solid-state object, which is filled with mass. It is an inner solution of Einstein equation of the rotating solid-state object. The inner solution of rotating solid-state object is unknown. If the shape of the rotating solid-state object is a sphere, then inside of it space-time must have characters of Schwarzschild inner space-time and rotating coordinate system. And it must be continuous smoothly with Kerr space-time on the

surface of the object. If we get above solution, then next we will discuss the external space time of the rotating solid-state object, which has valuable rotation. The solid-state object, which has valuable rotation, can generate a gravitational wave. We will be able to get information of energy-momentum conservation by analysis of above gravitational wave.

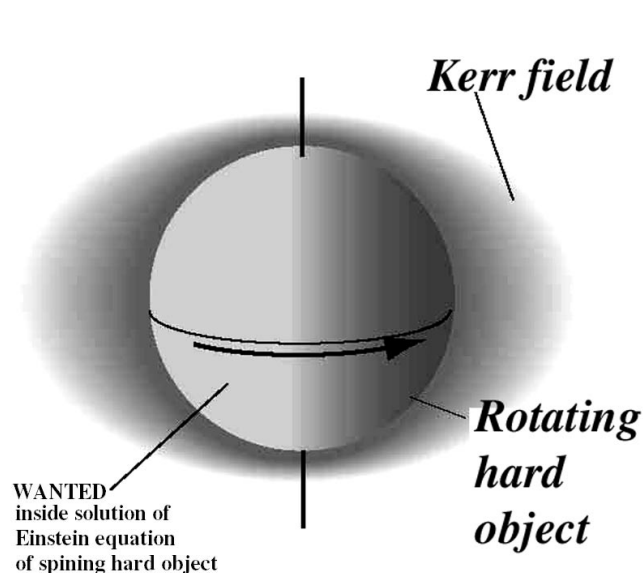


Fig.1 Space-Time propeller.

Rotation of the turntable and the wheels causes a difference of time delay late in the turntable and the wheels. Time delay in the wheels (at point P) depends on  $\sin\phi$ . It means that time delay of P at  $0 < \phi < \pi$  and P at  $0 > \phi > -\pi$  is different.

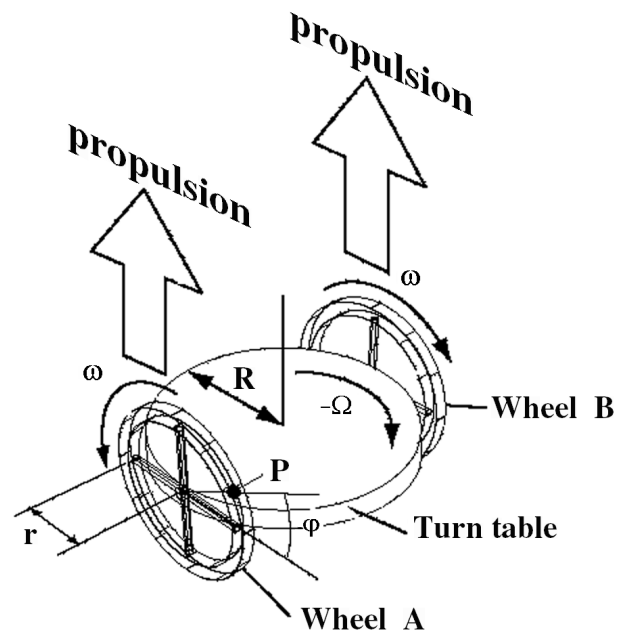


Fig 2. Space-time image of rotating hard object.

Space-time structure of inside field of rotating hard object is unknown. Out side solution should be Kerr field. Both fields should be smoothly continuous. To know the structure of inside field is the first step for the discovery for activity matter of space-time propeller.

## Rythmodynamics of Amplitudeless Fields

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*Theory is a well-reasoned hypothesis!*

*In this article we give an example of hypothetical black holes and effects, which accompany this phenomenon. This example helps us to develop the closest reason of gravitational attraction of the bodies. Also we introduce new ideas of amplitudeless field (gravitational field), amplitudeless quantum (graviton), frequency horizon. It is supposed that the reader has already got acquainted with the main principles of monographs "Rythmodynamics" and "Frequency space".*

## BLACK HOLES

In the XXst century all people know about black holes. "According to the Newton's laws and theory of relativity even the only one quantum of light cannot leave the star. Space in the place, where black hole appeared, becomes distorted and isolated in itself." [14].

In the world of science when we speak about black holes two theories are considered to be principal. These are classic (diffusive) and "neoclassic" (Buracanian) concepts of cosmogonical process. The first one is based on the ideas and constructions by V. Gershel (the end of the XVIII century). V.A. Ambartsumyan proposed another concept in the late 40s of the XX century.

In contrast with the "classics", who consider black holes to be the natural steps of evolution of substance, the «buracans» postulate the hypothetical "prestellar substance" (D-body) as a relic heritage of cosmogonical



# PHYSICAL PROPERTIES OF “AXION (SPIN) FIELDS”

## Influence of “Axion Field” on Hardness of Pearlitic Cast Iron

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The samples of iron alloys were tested on their microhardness in 1993 by means of the equipment PMT-3 (see “Results of experiment on studying of influence of axion radiation on hardness of metal”). The tests were made to find the possible effects of axion fields on the various material objects. As a result of test the changes in microhardness were registered. These changes were both the decrease and increase of microhardness. A series of experiments on pearlitic cast iron were made in 2000 (C-3.5%, Si-0.8%, Mn-1%, S-0.15%, Cr-1%, P-0.15%).

In the laboratory of KSS Iron Kazgan mechanical plant the tests of surface hardness were made by Brinell's method.

The tests were conducted with the load of 3000 kGauss and a ball of 5 mm diameter. Generators of three modifications were used for radiation. They are the generator «COMFORT-M» (K), the generator with an optical excitation (O) and the generator of (S) type.

Radiation by various types of generators showed the same increase of hardness of pearlitic cast iron in the

limits of error. Hence, we can make a conclusion that the reversible phase conversion, which was unknown before, takes place in the cast iron under the influence of “axion field”. This process gives a fixed step of hardness change.

#	Type of generator	Average value	Error	% of change
1		460,5	5,5	11,4
	K	512,8	5,3	
2		470,4	4,4	9,1
	S	480,1	7,4	
3		403,4	17,2	10,3
	O	445,0	6,2	

In the laboratory of material composition of Chemistry-metallurgical Institute of Academy of Science of Republic Kazakhstan the measurements of hardness were made on the separate phases of cast iron (pearlitic, cementite and conglomerate). These measurements were made by means of the equipment PMT-3 with the load of 50 Gauss and microscope magnification of 487\*. The diamond pyramid with a square base and vertex angle between the opposite sides of 136° was used as a indenter instrument (indicator). The radiation was made by “axion field” generator “Comfort-5”. The results of measurements are given in the table.

From this table we can see that pearlit and cementit conglomerate phases are mostly expose to the influence. It can be explained by the maximal activity of carbon in these phases.

#	Phase component	Average value	%of change
1	Pearlitic phase before the radiation	416,0	15%
2	Pearlitic phase after the radiation	478,2	
3	Cementit congl. before the radiation	1524,1	17,8%
4	Cementit congl. after the radiation	1794,8	
5	Cementit plast. before the radiation	1711,6	-2,4%
6	Cementit plast. after the radiation	1670,5	

### Results of experiment on studying of influence of axion radiation on hardness of metal

Measurement of metal hardness is one of the kinds of mechanical testings. Hardness is an integral property, which is defined by many mechanical characteristics of the studied material (plasticity, limit of elasticity, toughness, etc.). The influence of axion radiation (AR) on the hardness (microhardness) of ferricarbonic alloys was studied in the given research. In particular we studied steel and cast iron selected from the production technical prototypes.

Measurement of hardness was made by means of the equipment PMT-3 with the load of 20 Gauss, 100 Gauss and 200 Gauss and microscope magnification of 487\*. The diamond pyramid with a square base and vertex angle between the opposite sides of 136° was used as a indenter instrument (indicator). The results of measurements are given in the table.

As we can see from the table, the change of hardness values during the influence of AR in comparison with the initial state of iron took place practically in all cases. So, for the mild annealed steel 08J the decrease of

hardness was observed at 6-8%, i.e. weakening of metal took place. For the high-carbon alloys (steel of V-8 kind, cast iron ) the increase of hardness took place at 27.0-35.0%, which is the evidence of occurred hardening.

Thus, it was stated that AR influences the atomic- crystalline state of ferricarbonic alloys, and it was proved by the change of hardness.

/Signed/

L.A.Dachno

The chief of laboratory of metal - management and plastic deformation

The characteristic of a sample of metal	Value of microhardness, kg/mm <sup>2</sup> * H%, H (relative change of microhardness)				
	Initial condition	Source AR-FeO	Source AR-Mn	Source AR-C	Source AR-Se
Steel 08J (C=0.08% of weight, annealed, sheet)	161.2±2.4	151.6±3.0 (-0,6%)	148.2±5.3 (0.8%)	164.8±5.4 (+2.0%)	151.7±4.8 (-6.0%)
Steel U-8 (C=0.8 of % of weight)	636.6	60.5±30.8 (+35.0%)		810.4±17.4 (+27.0%)	
Cast iron (C>2.5%)	361.4±9.8	521.3±68.7 (+31.0)			

## Inertial Propulsion Drives

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### Introduction

The notion “inertial propulsion system” or device, which is moved by means of inertia forces, requires an exact definition. Usually the “drive” is a wheel, track, propeller or gas flow reaction. By means of “drive” the moving device is attracted or repulsed to the support, which exists outside the device.

Inertial drive does not interact with any support outside the device, but it interacts with the body of device by means of inertia force.

So, it is more true to name the inertial drives as an “inertioid” according to inventor Tolchin, Perm city, Russia. He has been made such sort of systems for more than 30 years [1]. His book about mechanics of 1969 was the cause for critical attacks on inertioids. For example, Dr. Gulia [2] states that unidirectional motion by means of inertia forces is impossible. But other scientists [3] like Dr. Levinson L.B., for example, wrote that all calculations in techniques take into consideration real inertia forces.

So, the notion of inertioid depends on the notion of inertia. Theoretical researches have a conclusion: reality

of inertia forces follows from Newtonian mechanics, but the fictitious inertia forces are the effect of Einstein's relativity theory.

According to Newton, there are three real inertia forces: second law force, centrifugal force, Coriolis force. Let's consider the notion of space and forces.

### Space

According to modern concept, the space is a closed material medium (Ether), which expands. All bodies are connected by gravitation field and they move. Magnetic, electric, electromagnetic and gluon fields also exist in vacuum. The space does not exist without a physical vacuum, which is a material medium, like river and sea cannot exist without water. Physical vacuum consists of moving virtual particles. The geometry of the space is Euclidian.

### The Gravitation Field

The value for intensity and distance of propagation of gravitational field in space depends on the value of mass, numbers of atoms; those consist of particles (protons, neutrons, electrons). Each particle has its own gravitational field and it conforms to the fact: air atmosphere of the Earth (atoms and molecules) is kept near the planet by gravitational field. From Mendeleev's periodical table it is obvious that atom, which has more protons, neutrons, electrons, has greater mass and gravitational field. So, gravitational field of any body is a joint, total field of all neutron, proton, electron

# On the Significance of Conical Shape of Rotor in Clem's Generator

Alexander V. Frolov

At first I found information about Clem's generator on a web site <http://prometheus.newpower.org/>. I have principally different understanding of the given technology. Creation of the given motor-generator is impossible without such understanding, so I should dispute with authors of "Prometheus" web site.

So, in 1972 Richard Clem announced that he invented an automobile engine of a closed cycle, which produced 350 horsepower and worked in self-running mode. The generator weighted about 200 pounds. The main part of its mass is rotating vegetable oil, which was heated up to 150°C during its work. Due to this reason we should not use water because it will boil. There is a conical rotor inside the generator and it is fixed on a horizontal axis. The axis, on which this conical rotor is fixed, is empty. The oil moves inside the axis and passes into spiral coreless channels inside the conical rotor. They are wound round the conical rotor and they end near the foundation of the rotor with nozzles (atomizers).

The figure is taken from the web site "Prometheus" <http://prometheus.newpower.org/>

In the beginning of operation the starter motor produces rotation and the liquid is given to the central axis (axle) by the pump under the pressure of 300-500 pounds on 1 square inch. Then the liquid flows by spiral channels and runs away through atomizers. The more the pressure of liquid, the more rotation momentum of the rotor is.

Thus the rotor is placed inside the box (body), the liquid (oil) does not consumed. Liquid is heating during the work that requires the presence of heat exchanger to emit heat into environment. The rotor begins its self-rotation with some speed, which is independent from the starter motor. Speed of rotation is about 1800-2300 rpm.

**The main question is: "Do we necessarily need a conical rotor or a cylindrical one?"**

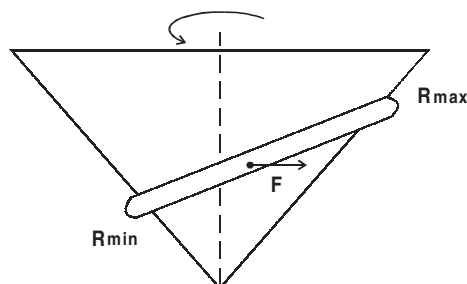


Fig.1

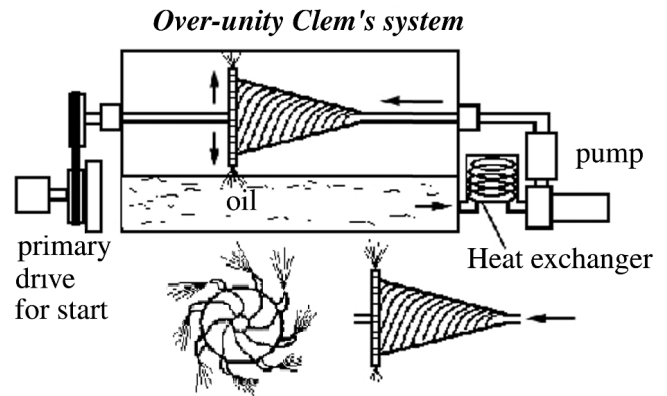


Fig. 2

Let's imagine the conical rotor with a tube winded on it and placed into some conical body:

Cone is an essential part of this design, since this is a gradient of centrifugal force that act on liquid and makes it to shift in the area of bigger radius of rotation (except the force, which is created by the pump). So we get a closed logic chain. Rotation creates centrifugal force, which creates pressure to the wall of conical channel in such a way that this pressure accelerates rotation and increases centrifugal force. The more the pressure of liquid, the quicker the cone rotates increasing pressure.

It is evident that atomizers also do their share in the work of generator increasing moment of rotation. This effect was previously known as "turbine by Heron from Alexandria" and later as Segner's wheel.

However, conical shape of the rotor allows getting a directed axial tractive force that can be used in reactionless drive of a new type. Of cause, the direction of rotation and direction of conical spiral should be coordinated.

**Conclusion:** The conical shape of the rotor creates a gradient of centrifugal force. Due to this, the movement of liquid appears, which goes in the direction of maximal rotation radius. Momentum of this movement is transferred from liquid to the body and the whole system will have a propulsion force. The tangential component of this force is responsible for rotational momentum of the rotor. So, modern development of different versions of Clem's design seems us to be a very perspective project for the future fuel-less energetics.

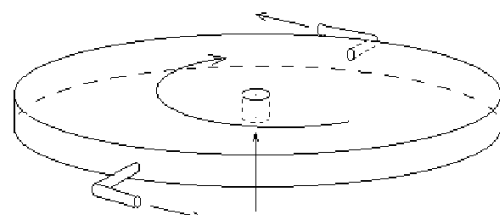


Fig. 3

# On History of Cold Nuclear Fusion in Russia

Review prepared by Alexander V. Frolov

On December 25, 1991, the Moscow Council got an official letter from the Moscow Committee on support of the work by Ivan S. Philimonenko (G.V. Kravzov was the chairman of this committee). The letter told about development work made by the scientist, rocket-space techniques designer Ivan S. Philimonenko. This committee expressed its concern about the delay of the development work in spite of their great importance. The author of its work was infringed upon his professional and social rights.

As it follows from the facts presented by the declarant, the development work by Philimonenko concerned the creation of pollution-free energy systems, systems on neutralization of radiation and associated units.

According to the profile of its activity the Subcommission of Moscow Council on ecological problems of industry, energetics and transport studied the given problem in-depth and made a huge work to define the real state of affairs. Together with the Standing commission of Moscow Council on legality, law and order and human rights protection and Standing commission of Moscow Council on science and techniques, the Standing commission on ecological problems of industry, energetics and transport (hereinafter referred to as the Subcommission) made the following:

- studied the publications devoted to the works of Ivan S. Philimonenko published in Russian free press;
- required all necessary information from the corresponding organizations;
- acquainted through its representatives with technological start of this type of works on the corresponding plants;
- contacted with the Supreme Soviet of Russian Federation, RF ministries and departments;
- intimately contacted with the author of the developments and his colleagues;
- took part in a number of meetings, conferences, symposiums of the corresponding subject conducted in Russia, Ukraine and Byelorussia.

As a result of this work the Subcommission stated the following reliable information about the scientist and designer Ivan S. Philimonenko and his development work. In 1960 the Head Space System Designer Sergey P. Korolyov, Marshal Gregory K. Zhukov and Acad. Kurchatov assisted these new developments. Kurchatov thought these works would be of great importance in future and said it to the inventor during their discussions. Marshal Gregory K. Zhukov personally sent a wire to the Kremlin: "Being concerning about the destiny of Russia, I ask to sign this resolution". He mentioned the Resolution of USSR Council of Ministers

and USSR Central Committee of the Communist Party #715/296 of 23.07.1960. A development of new methods to produce energy and protection from the nuclear radiation by I.S. Philimonenko was planned according to the following principles. They are:

- high efficient generation of energy;
- creating of thrust (propulsion) without the reactive mass flow;
- protection from the nuclear radiation.

Approximately 80 organizations were drawn to this research program, for example "Lutch", "Red Star", Research Institute of Heat Processes, corporation "Energy", Russian Academy of Sciences, Ukrainian Academy of Sciences and Byelorussian Academy of Sciences. Ivan S. Philimonenko was appointed as a responsible senior designer of this line. The first outstanding result of this program was the creation of energy systems "Topaz-1" and "Topaz-2", which were used on the satellites "Cosmos-1818" and "Cosmos-1819".

The next step of the program was to develop and create the pollution-free thermoemission hydrolytic energy system (TEHES), which has no analogies in our country and abroad.

The difference of TEHES from "Topaz" is the usage of low temperature nuclear fusion system as fuel element instead of a nuclear reactor. The nuclear fusion system works in low temperatures ( $T=1150^{\circ}\text{C}$ ). Its lifetime will be 5-10 years without refueling (the fuel is heavy water).

In 1960-68 they have got the first positive result, which could be applied for production. In particular, they got power output parameters of the system of 200 Watt, hydrogen and oxygen were generated as well as such components as helium 3, helium 4, tritium, oxygen 16, oxygen 17 and oxygen 18. It was the evidence of the fact that they have got the nuclear fusion with the temperature of  $T=1150^{\circ}\text{C}$ .

The author stated that these systems do not emit any pollutants to the environment during its operation. They consume heavy hydrogen only. TEHES could become a real alternative to the existing faulty energy systems (nuclear power station, heat-electric generating station, hydroelectric power station, boiler-house, diesel, etc.).

Also TEHES could be applied

- in industries, which consume hydrogen (airplanes TU, for example), oxygen (metallurgy);
- to power existing combustion engines instead of liquid fuel;
- in new generation of engines for the water, land and air transport;
- as an autonomous long-term energy systems at home, in the rural areas, in back regions.

As the scientist states, the systems of a special modification, analogous to the above-mentioned

systems, can neutralize radioactivity, for example those emitted to the environment (in Chelyabinsk, Semipalatinsk, Novaya Zemlya, Chernobyl). Systems to neutralize the radioactivity could be placed on the land, air transport, and spacecraft for the corresponding purposes.

In 1968 the official works by Ivan S. Philimonenko were stopped, and the author had no chance to complete his experiments on neutralization of the radiation.

**In 1962 Ivan S. Philimonenko got a patent priority # 717239/38 of 27.07.1962.**

Later he tried to register it as a discovery, but on 30.12.1970 he got an official answer # OTED 1179 about the necessity to revise his application due to the factual multiply of his claims that is not one discovery but several discoveries. That's why he still has no patent for his inventions.

Also his ideas were discussed in free press. Those are: "Tekhnika Molodyogi" #2, 1970, newspapers "Moscow Pravda" of 16.04.1971 and "Socialistic Industry" of 24.04.1971.

The announcement about the cold fusion experiment made by American scientists Stanley Pons and Martin Fleischmann followed the works by Philimonenko. The interest to the cold fusion in Russia increased again. During 1989-90 in NPO "LUTCH" Minatom RF two experimental models of energy system by Philimonenko were produced to recommence the experiments on cold nuclear fusion. Then three thermoemission hydrolytic transformers for the pilot energy system were developed and created. Necessary experimental and design works were made. Preliminary methodical provision on calculation of the systems was made.

The high level of the systems made by Philimonenko is proved by the fact that USA acquired the thermoemission nuclear reactor «Topaz», which was mastered by USSR space industry.

Technical characteristics of TEHES systems, in comparison with the existing nuclear power stations and nuclear energy systems under project ("Tokomak"), showed that the thermoemission nuclear technology has big advantages in front of the fission reactor. However, as we know, the works on realization of nuclear energy systems based on the light nucleus fusion are monopolized by the line oriented on the thermonuclear fusion on the systems of "Tokomak" model. This work has been conducting for 40 years and the Director of Institute of Nuclear Energy E.P. Velikhov considers, that we can expect such results not earlier than the middle of this century.

Now there are a lot of articles about Ivan Philimonenko and his works published in free press. The committees to support the work of the scientist were established in Moscow, other Russian cities, Ukraine and Byelorussia. Foreign scientific and military organizations are

interested in his developments, USA in particular. There were some attempts to repeat the experiments by Philimonenko on cold nuclear fusion (1989). In this case we cannot exclude the drain of information from Russia.

As the author of these developments consider, the further work requires the initial, developmental and resource testings on the existing scientific and experimental base in Moscow

Nowadays there is a problematic environment situation in Moscow and in Russia as a whole. There is a direct relation between the increase of radiation pollution and oncological sickness rate and death rate. In this connection the development work by Philimonenko is of great importance.

The Subcommittee attended to the further worsening of ecological situation. Together with the Moscow committee on support of the works by Philimonenko addressed to various departments and tried to attract their attention to the Philimonenko's developments (1991-1992). This information reached RF President and Government. President gave an order to Russian Academy Of Science (Osipov Yu. S.) and the Ministry of Russian Federation on nuclear energy (Mikhailov V.N.) to prepare the proposals how to continue the works by Philimonenko. But the President of RAS, Acad. Velekhov E.P. announced that these materials do not contain any scientific and technical information, which could be useful to estimate the ideas by Philimonenko.

*There is a question: Who should estimate new ideas? One time more it seems evident that RAS can develop scientific problems only in the framework of existing conceptions and RAS is not ready to support qualitatively new ideas.*

In 1992 the Subcommittee on ecological problems attended the NPO "LUTCH" and had a meeting with scientists and deputy director on production Kleschyov A.M. He and his colleagues proved that they have been working to reconstruct the system (TEHES) under the leadership of Philimonenko. The system itself and design documentation were also demonstrated to the Subcommittee.

The Subcommittee was surprised with the fact that leaders of Russian science had not found any chance to get acquainted with these ideas and their realization. The Subcommittee hopes that in spite of Russian instability the government bodies will find some ways to pay attention to the unique developments made by outstanding scientist.

On the basis of this analysis the Subcommittee made the following conclusions:

- To recognize the works by Philimonenko to be an outstanding achievement in Russian science.
- To give the inventors certificate to Philimonenko on his TEHES "KURS".

- To restore all professional and social rights of the scientist.
- To address the Russian government for the support in further realization of Philimonenko's developments and assign a priority on these developments to Russia.
- To revive the testing works on Philimonenko's TEHES as well as studying and introduction of his developments on protection from the nuclear radiation.

### Short biography

Mr. Ivan S. Philimonenko was born in 1924 in Irkutsky region. In 1941 he went to the front of the Great Patriotic War. From 1941 till 1945 he has been taking part in military operations on the North-West, South-West, 2<sup>nd</sup> Ukrainian and Zabaikilsky fronts of the Great Patriotic War as a scout. He has the Order of Red Banner, medals for the Victory over Germany, for the Victory over Japan and others.

From 1945 till 1951 he has been studying the Technical School named by Bauman and showed himself to be an advanced, disciplined and active student. He had an authority over other students, heads and teachers of the faculty.

From 1951 till 1967 he has been working in OKB-670 (design bureau). He began as a technician-designer and from 1963 he has been working as a senior designer. In 1954 he got an academic degree in nuclear physics.

From 1967 till 1968 he has been working in MKB "Krasnaya zvezda" as a senior designer. The leaders of the bureau honored him for the successful works on creation of new techniques.

In June 1968 he was discharged due to liquidation of the department from the structure of the bureau. Analysis of this situation made by the Subcommission allowed finding out that the liquidation of this department was made due to:

- the conflict between Ivan S. Philimonenko and leaders of the bureau, because he found some breach in technological process in this bureau, which caused the radionucleid pollution of the Moscow surroundings;
- the course of technical policy of this industry was changed by the higher technical leaders. They were oriented on development and creation of systems using the energy of nuclear fission of heavy chemical elements isotope and creation of nuclear power stations and systems of "TOKOMAK» type.

From 1968 till 1989 Ivan S. Philimonenko has been practically unemployed. He tried to address in various departments with a requirement to continue his scientific work and creation of pollution-free thermoemission hydrolytic energy systems and systems for radiation neutralization. But he had no positive results.

In 1989 Ivan S. Philimonenko suddenly got a proposal from the firm NTKO "FORT-INFO" to head the works on his subject as a senior designer. 8 months after he was moved to the firm NPPSO "KURS" due to unknown reasons. He had not got any salary there and then retired. Now he is not working on his subject.

### Editor's: notes on aging aspect

Mr. Ivan S. Philimonenko, the author of Russian "cold fusion" research program (1960's) claimed the following: all people have about 1400 years of natural life resource. His calculations are based on the real 7-year cycle of human biological cell life period and the known resource of "cell repair", which is about 200 times. In other words, we are living in permanent biological repair process and activity of this repair depends on environment. So, there are  $200 \times 7 = 1400$  years of resource, if there are no any reasons for repair. The cause for aging according to Philimonenko is the so-called "background radioactivity", which we can see anywhere on the planet. It is produced mainly (about 90%) by potassium isotope K-40. It is a radioactivity element and it periodically emits electrons. Human organism is building during many years from natural chemical elements including K-40 and other isotopes. That's why the electron emitted by isotope permanently damages all biological cells on its way. This is the reason for the accelerated spending of the human biological cell resource.

It is important to know the historical fact: the background radioactivity was created by some accident long time ago, and geologists know, when it occurred. Before it all people have been living for many hundred years according to old books and ancient data.

Radioactivity elements of different kinds are collected inside of each human body with food and air. We are "collectors" of isotopes and there are no easy medical ways to remove it from body. **But now there are new methods to reduce radioactivity by means of special fields.** Particularly, a special generator based on the Moebius band elements (designed by Dr. Ivan M. Shakhparonov, published in New Energy Technologies, issue #2, 2001) produces stabilization of isotopes, i.e. decreases the radioactivity, and it was measured in many accurate experiments. Also in August of 1995 Atomic Energy of Canada, Ltd., published in Newsletter of The Planetary Association for Clean Energy a review of modern methods to transform the radioactivity wastes. So called "scalar field" can be used for the distant influence on radioactivity.

In Philimonenko's research work of 1960 the same effect was discovered for the "cold fusion" generator. There are modern experiments on vector magnetic field influence on radioactivity, plasma wave and other methods, which are not a theory but a real working technologies, and it can be used to stabilize isotopes in human body. Why this important work is not known yet? Do people have not any desire to become younger? This question is not of technological nature, but of political one.

School, college, office, pension... Now it is a standard 60-80-year period of life to change the "biological material" during the natural selection process. But let's assume, that this short period is not a law of Nature, but some temporary program for the civilization, which is in the initial state of its development. Really, most people are not ready to make their life sensible and purposeful. Thus, they do not need many hundred years of life. Now we already have the new technologies to reduce radioactivity by means of special fields, and the aging process can be normalized up to 1400 years period. Are you ready to think about it?

Modern economy, politics, finance are not ready for it and all old systems will not work in the conditions of new civilization. But the World should be changed for the better one.