Russian mosaic LENR. Part I. Experiments.

Russian mosaic LENR

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Part I. Experiments

1. Introduction

This review aims to consider together some disparate facts,
known mainly only to specialists working in the field of low energy
nuclear reactions (Low Energy Nuclear Reactions - LENR). These facts due to various
the reasons are little known to the general scientific community. Active researchers in Russia
in this area, apparently, several dozen, and around the world several hundred. it
quite a bit compared to the large army of nuclear physicists. For a separate
private physical subject, this would seem to be quite normal. However, the phenomenon about which
in question, requires much more effort, since it is irreducible to the already studied
physical processes, and, as many believe, claims the need to revise
generally accepted theories. In addition, many believe that the development of this theme promises
an inexhaustible safe source of energy for humanity.

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These works are either unknown to a wide audience, or are known only in the light of scandals, with which this area of research is oversaturated. The dissemination of objective information in the traditional way - through refereed scientific publications, and then - through popular science articles - hinder as objective factors (lack of recognized at least within this community of the theoretical explanation of the phenomena), and subjective (distrust of the experimental results of most scientists "from the outside"). As a result, this area was out of wide scientific discussion.

For obvious reasons, this review contains only a part of those known to me at this time. moment of the results of experiments in this area. If we mention all the results, at least somehow- then related to this topic, I'm afraid this will no longer be in favor of clarity of presentation. The pile of facts will only confuse the already rather confusing picture of the phenomenon, although it can give an idea of the "scale of the disaster". So I preferred the most qualitative long-term experimental research with interesting results, mainly published in peer-reviewed publications. Total number there is, of course, much more research. Consideration of theoretical works deserves a separate work and is beyond the scope of this review.

In addition, I deliberately focus on the results obtained in the course of the review. research in the former USSR - Russia, Ukraine, Kazakhstan, mainly during last 5-10 years. On the one hand, these studies have quite recognizable meaningful specificity (preference in studies of the transmutation of metals under the effect of electrical discharges, while the world trend is the study of nuclear fusion deuterium to form helium and tritium, mainly during electrolysis). On the other hand, post-Soviet methods of fighting for scientific truth are in many ways unique to the world scientific community (a vivid example is the activities of the RAS commission on pseudoscience). This specificity, as well as these actions, will also be given attention and assessment.

Finally, I hope this review can be useful not only for external software relation to this area. The fact is that, according to one of the researchers, in this area is in the "race for the Nobel prize". In such a race, researchers prefer get results on their own and are reluctant to cooperate with each other. Everybody wants to get the skin of a bear, but the bear turned out to be wandering. During communication with researchers, I noticed that sometimes one scientist, mistrusting another, can ignore its results. Sometimes it happens that not all of the work of some researcher (and this review considers only experimental work) are known other researchers simply by virtue of the fact that regular journals in this area are still no, and the existing central physical journals often send such works to cart only for the subject of the articles. It is possible that this review will help someone find missing links for their reasoning.

2. The price of twenty cubes of helium

In June 2008 in Moscow at the theoretical seminar of the General Physics Institute, a report was made LI Urutskoeva entitled "Cold fusion: the second coming". It had talks about two experiments. One was conducted in 1922 by two Chicago chemists Wendt and Irion, the second - in May 2008 in Japan Yoshiaki Arata,

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professor at Osaka University. At the time of the presentation, a Japanese public demonstration (http://science.compulenta.ru/358481/) was the most striking of the latest events in this region, and noticeably stirred up the world community, forcing many to think seriously, and remember the history of cold fusion.

In 1922, Wendt and Irion studied the electric explosion of a thin tungsten wire in vacuum [Wendt 1922]. The main result of this experiment is the appearance macroscopic amount of helium - experimenters received about one cubic centimeter of gas (under normal conditions) in one shot, which gave reasons to assume that the fission reaction of the tungsten nucleus is taking place. Opponent of these results were delivered by Rutherford - the creator of nuclear physics, a brilliant experimenter, and already then an indisputable authority in physics. Rutherford believed that in the conditions that were in the Chicago experiment, such a massive fission of nuclei is impossible. He did an experiment that he believed disproved Wendt-Irion's suggestions: by irradiating a 100 keV electron beam on a tungsten target, he did not find any traces of fission cores.

Now, 85 years later, one can roughly understand what Rutherford was wrong about - he did not admitted the idea of collectivity of the ongoing processes, and the current strength of his beam was much less current in the Wendt-Irion installation. But then the last word remained with him, and nuclear physics followed the path reflected in the textbooks, and which led to the creation of a nuclear and hydrogen bomb, uranium reactors and the "eternal" project classic fusion. And the results similar to those of Chicago, were for many years forward with a curiosity that runs counter not only to the practice of nuclear energy, but also to theory, justifying this energy.

There is a rather dramatic episode in this story, perhaps even playing a fatal role for nuclear physics. The experiments of Wendt and Irion, apparently, were carried out on the highest level of quality of the experiment. As a result of two dozen shots, each of which required the creation by hand of a flask of the original design, which served also with a spectrometer, about 20 cubic centimeters of gas were obtained. Spectrograms with each shot showed that the gas contained helium. To to make sure of this, it was necessary to conduct a not very complex chemical analysis. The authors write: "A complete analysis of a 20 cm ^{2} sample of this gas was planned , however the received sample was lost due to unforeseen circumstances (*was lost through an accident*), and it is necessary to interrupt further work until another sample; because of this, this report has been released in preliminary form. "The authors never resumed work after this loss. Rutherford's criticism, Wendt's health problems, the need to do everything all over again, the lack of funds to continue the experiments - everything these factors did not work in favor of this topic, and this branch was postponed for many years research.

The experience of 1922 is, apparently, the first experimental evidence low-energy nuclear transformations, and it was with him that the confrontation began between official science and individual researchers who receive at different times in strange, but at the same time quite recognizable results.

3. Deuterium and palladium

The second branch of low-energy nuclear reactions is associated with reactions involving deuterium. In the Arata experiment in 2008, as in the Fleischner-Pons experiment in 1989-m, the palladium crystal lattice is saturated with deuterium. As a result an abnormal heat release occurs, which lasted 50 hours in Arata after stopping the supply of deuterium. The fact that this is a nuclear reaction confirms the presence of helium in reaction products, which was not there before (if you pump palladium with conventional hydrogen, helium does not arise). And in favor of the fact that it is completely new and unexplored type of nuclear reactions, says the absence of neutrons and gamma radiation. Such reactions are not are described by modern nuclear physics.

Almost all activity in the west under the banner of cold fusion since 1989 has been going on with deuterium. The reactions of fusion of deuterium atoms to produce helium have already been well studied. in the process of studying classical thermonuclear fusion. And although it was about millions of degrees, cold fusion researchers might have thought that cold fusion was just an unusual way of initiating such a reaction in much more earthy conditions - with room temperature. But the whole history of cold fusion shows that it is hardly is the same process. The main criticism of opponents of experimental work is aimed at the discrepancy between three quantities: the amount of reaction products, radioactive radiation, and heat release. None of the known fusion reaction channels deuterium, the results of many experiments did not fit:

$$D + D \rightarrow T + p + 4.0\ MeV$$
$$D + D \rightarrow {}_3He + n + 3.25\ MeV$$

Critics usually say: "Experimental results contradict theory, and may be something anything, but not fusion. "It seems to me that they are right in this, and this type of nuclear reactions really new. To explain the new results, it is now necessary to significantly change the theory, and it is not even clear from which floors it is necessary to start rebuilding the building physics, which seemed to many, like a hundred years ago, almost complete. Lack of the repeatability of the results of many experiments also suggests that the nature of this phenomena have yet to be understood. Apparently only after the creation of a satisfactory theory this phenomenon in the eyes of the general scientific community will move from the category of incomprehensible a curiosity in the category of a full-blooded direction. But researchers from the LENR community have already have been operating at their own risk and peril for almost 20 years, working with a new phenomenon in a strong pressure from academic structures, and this activity in itself is already worthy respect.

Before proceeding to the consideration of individual experiments, I will note that results that are not usually considered in the context of cold fusion and transmutation of elements, namely, changes in the rate of nuclear reactions under the influence various external factors. Apparently, only generalizing experiments can show whether these phenomena are related to the LENR phenomenon.

4. Solin's experiments

Let's start with the results that were obtained back in the 80s, the results that, according to attitude to nuclear physics were completely "out of this world", since no

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way could not be explained by official theories, and have not been explained until now.
The M.I.Solin reactor (Yekaterinburg) is a conventional vacuum melting furnace where zirconium was melted by an electron beam with an accelerating voltage of 30 kV [Solin 2001]. At a certain mass of liquid metal, reactions began that accompanied by anomalous electromagnetic effects, energy release, exceeding the input, and after the analysis of samples of the newly solidified metal there were found "alien" chemical elements and strange structural formations. Author writes:

> "In the melting zone, there are volumetric propagating long-range forces that significantly affect the distribution of vectors of pressure forces in a liquid phase, a change in the shape of its free surface and causing the transition mass of matter from the state of stable equilibrium of the system to the state orderly and accelerated movement. At the same time, in the center of the liquid mass, although the input of the energy of the magnetic field by known methods was not carried out, there is the formation of dynamic disturbances in the form of wave ripples on its surface, and subsequently - spontaneous curvature and displacement of the interface the surface of the liquid phase with the vacuum space of the melting chamber. The relatively large mass of the liquid phase in this process is ordered accumulates in the area of exposure to an electron beam and with acceleration moves upward in the form of a traveling solitary wave, acquiring the shape of a cone and white bright glow, which in its shade clearly stands out from glow of liquid zirconium (Fig. 4-1) ".

Fig. 4-1. A solitary wave during the formation of a ledge (illustration from [Solin]).

As a result of some strange phenomena, the liquid metal begins to behave like Lemovsky Solaris, periodically swelling, then forming pits, ripples and standing waves. Vortexes are formed in the liquid, as well as solitary stable waves (solitons). In some modes, these processes are accelerated, and the amount of energy released becomes so large that it is necessary to stop the process by turning off the electronic beam:

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> "According to estimates, taking into account the above-described anomalous hydrodynamic, shock-sound and explosive effects occurring in the volume of a liquid phase with a large mass, the total amount released in it

energy is 1000 or more times greater than the initial input energy of the electron ray ".

The normal process of melting metal blanks has nothing to do with such processes: usually the liquid remains calm, with a smooth horizontal surface, with a visible trace of an electron beam. This is exactly how the melt behaves at the beginning of melting, until reaching the critical mass of liquid zirconium. And the fact of excessive energy release it is checked very simply - by a sharp increase in the melting rate of the blanks.

After the liquid mass has frozen, abnormal formations are observed in it - hollow spheres and cylinders, meandering "wormholes", nugget inclusions, and the structure itself metal differs significantly from the structure of ordinary zirconium.

"One group of defects is represented by extended tubular channels various configurations. They show the occurrence in hardened metal cavities in the form of interconnected sinusoidal wave and straight holes, hollow triangular wave loop-chain, consisting from regularly repeating semicircular links. These channels represent are also concentric annular holes. Also, in their configuration there are elements of the meander shape and regularly repeating symmetrical geometric shapes (Fig. 4-2) ".

a) x75

b) x250

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c) x250 d) x400

Fig. 4-2. Tubular channels in a zirconium ingot: (a) and (b) - in the form of sinusoidal holes, (c) - in the form hollow triangular wave loop, (d) - in the form of concentric annular holes (illustration from [Solin 2001]).

"Based on detailed studies of the structure and shape of the channels, it was found that that the shown channelized defects have their own shells very small thickness, i.e. are formations in the form of curved tubes with with the above configurations. The material of their walls, in contrast to the material the bulk of the zirconium ingot consists of a more fragile substance. It possesses increased microhardness (210 kg / mm) and is in stress condition. Therefore, when rendering on these walls a slight external exposure (pressure, injection, etc.) further spontaneous breaking their wall. "

"Studies by the method of secondary ion mass spectrometry have shown presence of lithium, beryllium, boron, barium in the nuggets found and elements of a number of lanthanides. Of these elements in the source material (in remelted zirconium) no. As shown by the results of the analysis of chemical composition in the products found in the zirconium ingot - nuggets, in contrast to the initial zirconium is much higher (by 2-3 orders of magnitude) sodium content, magnesium, aluminum, silicon, potassium, calcium, titanium, chromium, manganese and iron. X-ray spectral microanalysis and Auger spectrometry enrichment with the above-mentioned chemical elements has been established, as well as carbon, nitrogen and oxygen material of cylindrical and spherical shells and the above detected products. "

"In particular, the content of chemical elements in certain zones cylindrical and spherical shell was: sodium - up to 5 wt.%, magnesium - up to 2 wt%, aluminum - up to 5 wt%, silicon - from 10 to 45 wt%, potassium - up to 11 wt%, calcium - up to 3 wt%, chromium - up to 3 wt%, iron - from 15 to 43 wt%. An increased content of these chemical elements was also established and

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the presence of barium (0.60 wt.%) in the materials of the walls of the channels in the form of tubular formations shown in Fig. 4-2 ".

Actually, all of Solin's results cannot fit into this review - so much there are many of them, and they are so unusual. It is difficult to describe them even by analogy with some known processes, so I have to insert extensive quotes from the original text, just to make it clear to the reader how unusual this phenomenon is. Astonishing the nature of fluid movement is explained by the author of the study by the appearance of magnetic charges, and the state of the molten metal itself is called magnetic fluid. When Mikhail Solin himself believes that these experiments were ahead of their time, and that the theory,

explaining them will not appear soon.

5. Experiments Urutskoyev

At the end of the 90s, L. I. Urutskoev (REKOM company, a subsidiary of Kurchatov Institute), unusual results of an electric explosion of a titanium foil in water. Here, the discovery was made according to the classical scheme - it turned out implausible results of conventional experiments (energy yield electric explosion was too large), and the team of researchers decided to figure out what that's the point. What they found surprised them greatly.

The working element of the Urutskoyev experimental setup consisted of a durable glass made of polyethylene, into which distilled water was poured, a thin titanium foil welded to titanium electrodes. The electrodes were brought out through a tight polyethylene cover. A current pulse was passed through the foil from capacitor bank. The energy that was discharged through the installation was about 50 kJ, discharge voltage - 5 kV. The first thing that caught the attention of experimenters was a strange glowing plasma formation that appeared above the glass lid. The lifetime of this plasma formation turned out to be about 5 ms, which was significant longer discharge time (0.15 ms). Experiments have shown that this is not a breakdown from the leads. cables. The most interesting thing began when the spectrum of this luminous formation was filmed. [Urutskoev 2000]:

> "The identification of the line portion of the spectrum led to two unexpected results. Firstly, the presence of nitrogen and oxygen lines (they were very weakly expressed only in certain “Shots”), namely, these lines are always visible during an electric discharge in the air. In- second, the abundance of lines (more than 1000 lines in separate "shots"), and, respectively, and a significant number of chemical elements, which they correspond. From the analysis of the spectra, it followed that the plasma is based on Ti, Fe (even the weakest lines are observed), Cu, Zn, Cr, Ni, Ca, Na. If a the presence of Cu and Zn lines in the spectrum can be explained by a creeping discharge along structural elements of the installation and power supply cables, then the presence of other elements in the plasma defied interpretation. A change in the experimental conditions, in particular, a change in the mass of the exploding foil, led only to a redistribution of the intensity of the spectral lines, its elemental composition changed insignificantly. "

When the contents of the explosion products were then subjected to several spectroscopic methods inside the glasses, it turned out that there really are products of nuclear transformations: elements appeared that were not there before the explosion, the number of elements that were found as impurities in the original samples, as well as the isotopic composition of titanium has changed. Experimenters, realizing that they are faced with something inexplicable, we achieved the maximum purity of the experiment, and the samples of the original materials and reaction products were independently analyzed in various laboratories. The results were fully confirmed, and there was no doubt - with electric explosion, nuclear reactions occur.

By that time, similar results were obtained not only by Urutskoev (review and book VF Balakirev and VV Krymsky [Balakirev 2003-1], [Balakirev 2003-2] describe about ten studies with similar results under electromagnetic influences). But

it was Urutskoyev's group that went further and for the first time found another distinguishing feature new nuclear reactions - "strange radiation" in the absence of the usual for nuclear reactions of hard radiation. Briefly, this radiation can be characterized as follows way. It does not resemble any known type of radioactivity, it is biologically active, it affects the rate of beta decay, spreads from the installation at a rate 20-40 m / s, and it generates a certain shape of tracks on the emulsion. Very strange tracks.

These tracks resemble a tractor track - they are periodic in nature. They go to plane perpendicular to the direction to the foil explosion site (in this case, apparently, they "Slide" strictly in the plane of the emulsion). These tracks cannot be tracks electrically charged particles. At the same time, their character is influenced by the magnetic field.

> "The very first experiments showed that the shape of the tracks in emulsions is very different: these are continuous straight tracks, dumbbell-shaped ("caterpillar") tracks and long tracks of complex shape, reminiscent of spirals and lattices. On the Fig. 5-1 (a) shows a typical very long (l ~ 3 mm) track resembling track track or tire tread. This type of track is characterized by the presence of a second parallel track, differing in intensity blackening and length from the main. The trace shown in Fig. 5-1 (a), formed on a fluorographic film of the RF - ZMP, the thickness of the emulsion of which is 10 microns. In Fig. 5-1 (b) shows an enlarged fragment of the track, from which is clearly seen that the track has an intricate pattern. Draws on itself attention to the fact that for a grain size D ~ 1 μm, the track width is d ~ 20 μm. Estimation of the particle energy, made from the area of blackening, in the assumption of the Coulomb deceleration mechanism is E ~ 700 MeV. "

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Fig. 5-1. A typical track on film (illustration from [Urutskoev 2000]).

Then the following was done. The water and the remains of the foil after the explosion were removed from the installation and placed in a Petri dish, and at a distance of 10 cm placed a film, perpendicular
directed to the reaction products, and after 18 hours of exposure, we looked at the result. On the
Fig. 5-2 it can be seen that the same tracks were obtained from the reaction products as from the
electric explosion.

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**Fig. 5-2. a) Experiment scheme: 1- Petri dish; 2 - sample; 3 - photographic film; 4 - fiberglass.
b) The track and its enlarged fragment (illustration from [Urutskoev 2000]).**

"Detection of exactly the same tracks using nuclear emulsions thick
100 microns suggests that the source causing blackening is flying
strictly in the plane of the emulsion, since the beginning of the track differs in depth

emulsion from the end of the track no more than 10-15 microns. "

Fig. 5-3. a) A trail of the “comet” type; b) An enlarged fragment of the "comet head" (illustration from [Urutskoev 2000]).

When a magnetic field is applied, the tracks take on the appearance of a comet (Figure 5-3). All this made Urutskoyev assume that these tracks belong to electrically neutral particles with a magnetic charge (magnetic monopoles). Light monopoles were predicted by the French theorist Georges Loshak back in the 80s as a development Dirac ideas about magnetic monopole. According to Loshak's theory, the magnetic monopole is massless magnetically excited neutrino. To test this hypothesis were traps made of ^{57}Fe isotope foil placed at the S- and N-poles of the magnet were used. The experiment showed that when the foil is exposed to `strange radiation ', the foil on the S- showed a Mössbauer deviation in the spectrum in one direction, and at the N-pole in another:

> "The results of the measurements showed that in the foils placed on N-pole, the absolute value of the hyperfine magnetic field increased by 0.24 kgf. On the other foil (S), it decreased by about the same amount 0.29 kgf. Measurement error 0.012 kgf. "

The authors explain this by the related state of the Loshak monopoles with the iron nucleus.

Urutskoev conducted many other experiments to study this phenomenon. The results that were obtained during the tests turned out to be very interesting. high-voltage industrial electrical equipment in abnormal mode of short closures [Urutskoev 2007]. It was shown that in this case the tracks are also recorded monopoles, and that, as in the case of an electric explosion of foils in water, the isotopic composition titanium, from which varistors are made. The experimental conditions were

the following:

"Short circuit on the busbars in the complete switchgear
(KRU) is carried out by installing jumpers from
wire of any metal with a diameter of no more than 0.5 mm, the main task
the wire to be installed - initiation of the arc, which is then maintained
due to the power of the source for a given period of time. Value
of the supplied short-circuit current has a range from 1 to 40 kA, voltage
idle circuit - 8-10 kV. "

"A characteristic feature of the tracks is that they are mainly located
in the surface layer of the emulsion detectors. The footprints are markedly different each
from a friend in size. Transverse dimensions 5-30 microns, length from 100 microns to
a few millimeters. As a result of experiments, it was found that
the farther from the test site is the detector, the more
track width. So, traces with transverse dimensions of 30 microns (Fig. 5-4 a)
observed on detectors located at a distance L: 0.5 m <L <1 m, and
tracks with dimensions of 5-10 microns (Fig. 5-4 b) - at a distance L> 2 m from the place
tests. "

b

but

Fig. 5-4. Typical traces in the form of tracks obtained during the explosion in KRU (illustration from [Urutskoev 2007]).

"If the tests were carried out at currents I ~ 1-2 kA, then there are no traces on
detectors were not detected. On the contrary, if the tests were carried out at a current
I ~ 40 kA, many different traces were recorded. "

"During the tests of vacuum interrupters, not a single trace was recorded
"radiation", although 15 experiments were carried out on which
more than 20 photodetectors. This confirms the results of laboratory
studies in which tracks were observed only in an electric discharge in
environment. "

6. Experiments Ivoilov

NG Ivoilov (Kazan University) in the work [Ivoilov 2004] together with LI Urutskoev studied the Mössbauer spectra of iron foil when exposed to a "strange radiation ".

Further experiments of Ivoilov are devoted to the study of the properties of particles that form "strange" tracks, and their interaction with matter [Ivoilov 2005], [Ivoilov 2006]. IN double-sided photographic films act as detectors, and the author made "sandwiches" from photographic film and various materials, and also used an external magnetic field. Work can be roughly divided into two parts. The first one is experimenting with radiation from spark discharge in liquid with graphite electrodes. The current did not exceed 40 A, voltage - about 80 V. As a result, in addition to confirming the results of Urutskoyev, there were very interesting new results were obtained. Ivoilov managed to find paired tracks monopoles with mirror symmetry when the recording film was placed close to reflective material. Mirrored tracks were obtained from different sides photographic film - one from the side of the radiation source, the second from the side of the reflecting material (Figure 6-1). Ivoilov assumes that mirror pairs are S and N monopoles.

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Fig. 6-1. Symmetrical "pair". Focusing on the left track (illustration from [Ivoilov 2006], grid spacing - 1 mm).

As for the interaction with matter, it turned out that the magnetic particles are completely absorbed by ferromagnets (Fe and Ni films were used), aluminum shows itself as a weakly reflecting and weakly absorbing substance, and glass and monocrystalline germanium and silicon proved to be highly reflective materials.

When moving on to the second part, the author applies beta a radioactive source in a strong magnetic field, i.e. abandons the original method of obtaining monopoles in a spark discharge. What is this hypothesis? Ivoilov assumes that, since the Loshak monopole is a magnetically excited neutrino, then it should arise from the cosmic neutrino component, as well as from the neutrino beta decay components of local sources in the presence of a magnetic field. results

experiments confirm this hypothesis. Here's what the author writes:

"When working with photographic films, as a rule, together with irradiated films control films that have passed all stages of preparation were also processed, except for radiation. As control films in this experiment, we used photographic films that were within the estimated time experiment (10 min) in a constant magnetic field with a strength of 20 kOe. After development on the control films, the same characteristic tracks that arise when an electric arc burns in liquids. We called these tracks the background. If tapes are found near the background was not detected by the source in the absence of a magnetic field. When making into the magnetic field of the neutrino source (^{90}Sr), the number of registered the track time has almost doubled compared to the background. Moreover, part tracks had a clearly radial direction from the center, where the radioactive source. A similar result was obtained with the ^{137}Cs source . "

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"There have been more than 20 such experiments with beta sources, according to the results of which the following preliminary conclusions can be drawn:

1. The magnitude of the background (the number of tracks recorded on photographic films in a magnetic field without a neutrino source) is unstable in time. Moreover, the fluctuations this background completely correlates with the frequency of occurrence of tracks on photographic film when it is irradiated with an arc discharge (a parallel experiment in within one laboratory). This relationship appears to be fundamental character, the disclosure of which will bring understanding the mechanism of generation and the nature of the magnetic monopole. You can only assume that the source of the background is cosmic radiation, which carries particles unstable to beta decay that reach the Earth, such as mu-mesons. Therefore, it is appropriate to call this background the cosmic component.
2. The number of tracks on the films located at different poles of the electromagnet during the experiment, almost the same.
3. A decrease in the magnetic field leads to a simultaneous decrease in space component and an increase in the number of tracks caused by the presence of a neutrino source. Is of undoubted interest conducting similar experiments in stronger magnetic fields.
4. In the presence of a cosmic component, the introduction of a neutrino source into the magnetic field always increases the number recorded on the film tracks. This increase can be interpreted as direct evidence the theoretical prediction of J. Loshak about the identity of the magnetic monopole and magnetically excited neutrino.
5. Approximately equal result obtained when using two, significantly different in the activity of beta sources, evidenced by on the predominant role of cosmic particles in the generation process magnetic monopoles.

"Summarizing the results of two sections of this work, we can formulate the following main findings:

1. In the event of an electric explosion and an electric discharge in a liquid, compacted with a liquid the flowing current is a source of large magnetic fields, in which during beta decay of cosmic particles, magnetically excited

neutrinos, i.e. magnetic monopoles.
2. The so far unexplained component of cosmic radiation is
necessary factor for the production of magnetic monopoles in beta decay
unstable nuclei in a magnetic field.
3. S- and N-magnetic monopoles are created in pairs. "

7. Experiments Adamenko

In Kiev, in the private physical laboratory "Proton-21" (http://proton-21.com.ua/) under the leadership of S.V. Adamenko, experimental evidence of nuclear degeneration of metal under the influence of coherent electron beams. Since 2000 thousands of experiments ("shots") were carried out on cylindrical targets small (about a millimeter) diameter, in each of which an explosion occurs

the inner part of the target, and the explosion products contain almost the entire stable part periodic tables, and in macroscopic quantities, as well as superheavy stable elements observed in the history of science for the first time.

What is the Adamenko installation? The experimenters themselves call it high-current vacuum diode [Adamenko 2004]. The target itself is the anode - how as a rule, it is a copper wire with a diameter of about half a millimeter with a rounded end. An electron beam from the cathode coaxially strikes its surface, as a result of which the central part of the anode explodes (Figure 7-1). Explosion products settle on storage screens (discs with a diameter of about 10 mm with a hole in the center), made, as a rule, from the same material as the target (Figure 7-2). To study explosion products, the most a wide range of methods available in a modern laboratory.

Fig. 7-1. Scheme of self-focusing of the electron beam on the surface of the concentrator anode, exciting in its near-surface layer a soliton-like density pulse converging to the axis symmetry (illustration from [Adamenko 2004]).

Fig. 7-2. A copper target after an experiment with traces of solidified silvery-white "lava" on its petals poured out from the center of the exploded target (illustration from [Adamenko 2004]).

I will note in parentheses that in this case a private laboratory has been operating for about 10 years with a permanent investor-partner, these experiments are equipped according to the need researchers at a global level, and are led by highly qualified personnel,

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who worked in the leading nuclear centers of Ukraine. Very interesting that these are not random results. According to Adamenko, he went to these results for a very long time and purposefully; first the concept of a new controlled nucleosynthesis was born, and only then it found confirmation in experiment that in the field of LENR is rather an exception to the rule. Another significant detail: in 2007 Springer published an 800-page a monograph by the laboratory staff [Adamenko 2007], which is a collection of articles describing the results of numerous laboratory experiments, as well as theoretical articles. The volume of experimental work presented in the book is impressive, and, according to Adamenko, this is only part of the results obtained.

If we briefly describe the processes occurring with the substance in the target, then, according to the views of the researchers from the "Proton-21", here we are dealing with a previously not studied in laboratory conditions by the process of collapse of a substance triggered by the impact of a beam electrons into the surface of the metal anode, and leading to the formation of a "nucleon plasma ", with the subsequent production of the widest range of elements from it, as well as superheavy elements, with atomic masses of thousands of AU The process is similar to supernova explosions, and X-ray radiation in the spectrum is very strongly correlated with spectra of cosmic X-ray and gamma-ray flares.

The known elements resulting from the explosion are stable, i.e. reaction products non-radioactive. Moreover, experiments with the explosion of radioactive targets (^{60}Co) show a significant decrease in their radioactivity. Nuclear rebirth about 30% of the original target material is exposed. The amount of energy released per orders exceeds the amount of energy supplied.

The nuclear transformation of matter in a controlled process with the release of energy is already in itself a discovery with a claim for primacy in a new way of producing energy. But superheavy elements are not just a claim to something completely extraordinary, it is, apparently, one of the central moments of the phenomenon. The fact is that without the hypothesis of stable superheavy elements defy explanation many oddities in the results experiments ranging from energy balance to unprecedented effects recorded by several methods at once. Here are just a few of them.

The balance of reactions in terms of the binding energy, taking into account the initial substance (as a rule, this is ultrapure copper), and reaction products from known elements do not converge catastrophically. Measure energy is definitely very difficult here, and at first glance it seems that all this is the result too rough analysis, or even mistakes. But even if we assume that it's just errors in calculating the balance, when looking at the reaction products themselves, no less oddities. First, mass spectroscopy (including that carried out by independent laboratories) indicates unidentifiable peaks with a.u. more than 400. Secondly, ion bombardment of reaction products shows that on substrates on which

explosion products are deposited, in addition to the usual areas, there are "black spots". It means that from these areas, not only secondary ions are not knocked out, but also the primary ions themselves completely get stuck in the substance. This effect has not been observed previously in the entire history of ionic microscopy.

Thirdly, and this is already quite obvious and incredible, giant clusters are recorded tracks of particles emitted from one point already in the detector itself. The authors write:

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> "Localized track clusters have also been recorded on the shaded direct plasma streams in detectors in the form of either chaotic alpha tracks with density up to 100 / mm2, or in the form of centered track families. The appearance of giant track clusters with a well-pronounced the center of expansion and with the number of tracks> 100. The clusters include alpha particles, lithium nuclei, and possibly heavier nuclei with energies of the order of units of MeV / nucleon ".

In Fig. 7-3 shows such a macrocluster of 276 charged particles. Authors in the cited the above quote, apparently very carefully, almost between the lines said the following: if we take into account also particles not detected by the detector, released in other directions, we get an outrageous mass in AU. of the core that scattered here into many fragments. Finally, experiments with the analysis of the elemental composition of substrates with explosion products on different depths from the surface suggests the same thing: something much heavier than ordinary ions penetrates into the thickness of the metal in the direction from the point of explosion (researchers call it hot spot) to the same depth from the surface, when viewed along the beam from the hot points, and there it breaks down into many elements. Moreover, this is not the diffusion of these products themselves. decay: there is no such diffusion that elements with very different atomic masses turned out to be strictly at the same depth from the surface in the direction from the point departure, and these elements will not penetrate to such a depth - there will not be enough kinetic energy.

Fig. 7-3. The pattern of filling the detector with tracks containing a "giant" track cluster of 276 tracks (a); its separate fragment (b); diagram of directions of tracks (c) (illustration from [Adamenko 2004]).

Thus, the incredible assumption about the observation of the birth of superheavy elements is not a whim of a theoretician who desperately needs experimental confirmation of his theory (by the way, the existence of stable superheavy nuclei was predicted by the Soviet academician Migdal), and this is not an artifact of some method measurements. This is the only consistent hypothesis that explains the many very strange experimental results. And I dare to suggest that the hypothesis about superheavy elements - this is the rod on which further events around the opening of the Adamenko group - whatever these events may be.

Now, just a few words about S.V. Adamenko's theory. Again, unlike many
other LENR researchers, there is reason to say that this group,
perhaps they managed to understand the essence of the phenomenon that they are investigating. Causes of nuclear degeneration of matter under shock coherent action Adamenko sees in

the fundamental principle of minimization of some generalized integral of action,
managing the evolution of a complex system with self-organizing connections in a transitional
process initiated by an intense external disturbance, which has the character of a mass
forces or, in the terminology of Adamenko - "general dominant indignation." The most
the dynamic system here is the target matter with many connections between its
elements. The target substance is involved in the process of motion of the density wave by an external
impact - the impact of the electron beam on the target surface. A source of energy
spent on the reorganization of the system is the mass defect of the part of the
cores.

Since the integral of action during accelerated motion includes mass (inertia), and
the mass of matter in nuclei is dependent on internucleon bonds (determining the energy
communication), the system "rebuilds on the march" in such a way that the mass of particles,
transferring excitation energy, became maximum. Those. - "melting" into a nucleon
plasma. Then, when the process of shock cumulative-wave compression from the surface
cylindrical target reaches the axis, collapse occurs - deceleration, and the substance
is forced to condense into new nuclides.

And since the Migdal cores-many-thousanders have the highest binding energy at
nucleon, a significant percentage of nucleons are condensed into nuclei of just such superheavy
elements. The synthesis of such superheavy elements from ordinary ones is accompanied by the release
energy. Here is briefly described the essence of the phenomenon, as it is represented by researchers. Mechanism
this process, of course, requires a separate consideration.

8. Vysotsky, Adamenko - monopoles

The same command when studying the properties of hot spot radiation (HSP) at the facility
laboratory "Proton-21" investigated some related phenomena. One of them -
tracks of magnetically charged particles in a multilayer MIS structure (metal-dielectric
semiconductor). In a structure that usually serves as the basis for the production of microcircuits,
and is a "layered cake" Al-SiO_2-Si, tracks were found that appear
when exposing such a structure under the influence of IHT. Such particles behave like
a needle in the shuttle of the sewing machine - they periodically stitch through a layer of aluminum
with a small constant pitch (60 μm), leaving a fused sinuous hollow
a tunnel about one micron wide on its way (Fig. 8-1).

In the work "Experimental detection and modeling of orientation movement
hypothetical magnetically charged particles on a multilayer surface "[Adamenko 2006]
authors V.I.Vysotsky and S.V. Adamenko give an estimate of the energy release during the passage
of such particles through the metal - it turns out to be about 10^6 GeV / cm. These tracks go
perpendicular to the direction from the hot spot, parallel to the surface of the MIS structure.
The authors calculated that the most plausible hypothesis explaining this behavior
particles, is the hypothesis of a magnetically charged particle, which thus moves
through the paramagnet layer in an external magnetic field (which is just directed approximately
parallel to the surface).

(in)

(b)

(but)

Fig. 8-1. General view of the MIS-structure with track (a); a fragment of the track panorama containing all types repeating elements (b); highlighted areas show silicon emissions to the surface aluminum (c) (illustration from [Adamenko 2006]).

Further, the authors point out that simple deceleration of particles is not capable of generating such a volume energy at practically non-decreasing velocity of a particle in the track, and it is assumed that such particles are capable of magnetic catalysis of energetically beneficial nuclear reactions. Monopoles should stimulate nuclear reactions due to the fact that when moving they are very strong distort the electronic shells of atoms that they come across along the way, and thereby increase the likelihood of core tunneling and fusion. Falling into aluminum (paramagnetic) as in a potential well, a magnetically charged particle stimulates nuclear reactions with the release of energy. By melting the aluminum layer, the particle changes its magnetic properties (it becomes a diamagnet) and as a result seeks to "jump" out of this layer. Coming out of aluminum, while walking a certain distance along the surface, the particle is again attracted by the potential well of the paramagnet, and the whole process repeats.

The authors suggest that the external magnetic field is essential for this behavior. particles. An estimate of the speed of the observed monopoles, which was calculated based on their trajectory and experimental conditions, shows that this speed should be greater than 200 km / s - this is exactly how fast the particle must fly so that during its flight it does not have time the magnetic field changes significantly. This is important for the hypothesis explaining the behavior magnetic particle, since the step on the tracks remains constant throughout track, and, therefore, the entire track (2 mm long) must be produced in time significantly less than 30-50 ns (this is how long the current pulse lasts).

Obviously, a particle with such a speed as to be so mobile for a periodic changing the direction of its movement should be very light. If you remember the tracks, obtained by Urutskoev from the explosion products in a Petri dish (i.e., in the absence of a magnetic

field), then the hypothesis of Adamenko and Vysotsky about the high speed of movement of monopoles can turn out to be incorrect, if, of course, we are talking about the same phenomenon. At least, such a high speed contradicts directly measured by Urutskoev using two sensors with the propagation speed (20-40 m / s) of "strange" radiation from its installation.

9. Beta decay: strange influences

Another phenomenon is possibly related to the LENR theme. In 2002, at work meeting "Ultraweak effects on physicochemical and biological systems. Connection with solar and geomagnetic activity "at the Crimean Astrophysical Observatory National Academy of Sciences of Ukraine Yu.V. Ryabov made a report "On the stability of the beta decay of atomic nuclei "[Ryabov 2002]. Experiments carried out by the authors of the report show synchronicity of the rate of beta decay of various samples (^{60}Co and ^{137}Cs), and indicate the presence of a periodic component of gamma intensity during measurements semiconductor detectors (with a periodic deviation of 0.6% and a period of one day). The authors made a rather detailed analysis of the possible reasons for the appearance of such periodicity, a lot of control experiments have been done, and it is concluded that this is not an artifact, and that the periodicity of intensity is indeed inherent in beta decay.

Further, there are the results of many years of research by A.G. Parkhomov [Parkhomov], which assert the existence of some component of cosmic radiation, which affects the rate of beta decay. In long-term observations of the rate of beta decay with parallel fixation of other indicators (temperature, atmospheric pressure), pronounced annual and monthly fluctuations in the average speed decay (0.3% in the annual cycle, 0.02% in the monthly period, for these rhythms the correlation with temperature and other rhythms that could affect the results were not identified).

Noteworthy is the installation that Parkhomov used to test the hypothesis about nature. such rhythms. A radioactive source with a Geiger detector was brought into focus steel parabolic reflective mirror. In a situation where the mirror did not change direction in relation to the Earth, but simply rotated along with the diurnal rotation Earth, there were sharp, but rare bursts of radioactivity when the counting rate decay increased many times.

In a situation where the optical axis of the mirror made a scanning motion along the celestial sphere, there were compact areas on the celestial sphere with bursts. However, these sites were short-lived - to make a map of the "anomalous zones" on the celestial sphere did not succeeded.

Parkhomov notes, among other things:

> "3. The dynamics of bursts in time is very diverse. The simplest form is single bursts lasting a few seconds with increasing counting speed by more than 3 orders of magnitude. Longer events (lasting up to several hours) consist of short bursts of various amplitudes, complexly distributed in time.

4. In the presence of overcast clouds, there are no statistically significant bursts.
registered.
5. Placement of the telescope behind the window glass and aluminum shielding
foil does not significantly affect the performance of the experiments. "

Parkhomov further subjects these results to a comprehensive critical analysis, with
an indication of the additional checks he carried out to ensure that
the results obtained are not measurement artifacts. Omitting some of the author's reasoning,
I will immediately give the conclusions:

"The totality of the data obtained gives grounds for the conclusion that
the occurrence of bursts is associated with the presence of a focusing mirror,
concentrating the flows of some agent coming from the Cosmos. To be
registered installation described, this agent must have
with the following properties:
1. The ability to influence beta radioactivity.
2. The ability to be specularly reflected from smooth surfaces, and
mono-directional, which allows reflection by a parabolic mirror.
The information obtained during the experiments allows us to draw conclusions about
other properties of the agent. It is characterized by:
3. Strong variability in time and direction.
4. Uneven distribution of the probability of detecting bursts over
celestial sphere.
5. Inability to pass through clouds.
6. The ability to pass through glass and aluminum. "

Then the author makes a hypothesis that such characteristics may have
ultra-low-energy neutrinos with nonzero rest mass. This conclusion
is also confirmed by the earlier experiments of Parkhomov, with the use of spark
cameras [Parkhomov 2000]. In the early 90s, he investigated the phenomenon of diffraction
unknown cosmic component on periodic structures (recruited from
parallel thin plates of different materials, as well as concentric
annular grooves in metal, etc.). This space component led to sparks
discharges that were recorded on a photographic emulsion placed between two close
located flat electrodes under a constant voltage of about 2 kV.

Experiments with spark chambers and then with ionizing particle counters,
showed that the cosmic component has wave properties, is subject to
refraction and reflection in various media, and has a very strong penetrating
ability. The wavelength range calculated from the diffraction patterns turned out to be
quite wide - from micrometers to millimeters. Parkhomov then suggested that
these characteristics are satisfied by the ultra-low-energy neutrino component
hidden matter, it must be focused by astronomical objects (the effect
gravitational lenses), have a wide range of speeds (from 8 to hundreds of km / s) and appear in
experiment as strong fluctuations in the change in the intensity of the reaction of the reverse beta
decay with absorption of neutrinos / antineutrinos and emission of electrons / positrons.
Fluctuations should appear as periodic oscillations due to rotation
installations together with the Earth, as well as give the effect of bursts.

Fig. 9-1. Spectra of electrons (positrons) of direct (a) and reverse (b) beta decays. N_e is the number of emitted electrons (positrons), E_e is the energy of electrons (positrons), Emax is the maximum energy of the beta spectrum (illustration from [Parkhomov 2000]).

This has been shown experimentally. As a neutrino detector with ultra-low energy was used beta source $^{90}Sr + ^{90}Y$. Assuming that beta particles from reactions of direct and reverse beta decay have significantly different energy spectrum (Fig. 9-1), Parkhomov isolated the component corresponding to the maximum energy of beta particles - 2.27 MeV. The experiment showed that in the presence of diffraction gratings indeed, the magnitude of fluctuations in the yield of such beta particles increases, and at changes in the position of the diffraction gratings, a change in the intensity of the reverse beta decay.

10. Activities of the Commission on Pseudoscience: Back to the USSR

Let's pause for a while in the description of the experiments and go back to the past for a while. It is necessary to tell in what external conditions the majority of described works. Modern practice of science in the post-Soviet space cannot be considered outside the context of the history of Soviet science and all Soviet society as a whole. This context can be briefly described in one word: lack of freedom.

The scientist did not have the right to freely express his views, not only in the field of politics and public life. There was a time when a Soviet scientist could be physically destroyed for certain scientific beliefs. We all mourn the fate of Giordano Bruno. But we already almost forgot how in the 30-40s in the USSR scientists were shot "for idealistic and positivist views "(and adherence to the ideas of the theory relativity), deprived of the right to publish, not to mention the fact that, as of course of course, they were not allowed to go abroad. Whole sections of science were at one time under prohibition (cybernetics, genetics). The directions of science and technology, which were necessary for victory in the Cold War, received a priority direction, although scientists and engineers were often not asked if they agreed to increase the country's defenses: space technology, for example, was born in "sharashki" (design bureaus in which prisoner engineers worked).

After Stalin's death, they stopped shooting en masse, but they continued to persecute and imprison psychiatric hospitals. The party determined which areas of science were advanced and which were reactionary.

By a closed order in the 60s, it was forbidden to accept articles for publication, criticizing the special theory of relativity. The Academy of Sciences performed any ideological order.

In the early 90s, due to the massive departure from the country of the most capable scientists the potential of science has been noticeably undermined, and many regard these losses as irreplaceable. However, aged academic administrators, mostly remaining at their high posts, continued to lead the remnants of Soviet science, as best they could.

After the collapse of the USSR, science almost ceased to be funded in comparison with the previous ones from time to time. For the remainder of the budgetary financial flows, however, a struggle unfolded. So one shouldn't be surprised that one fine day an organ appeared in Russia, which as a pretext for the fight against pseudoscience and falsifications, he began to fight, among others, with in the following directions:

- Torsion interactions;
- Low energy nuclear reactions.

It is noteworthy that the former head of the Commission on Pseudoscience of the Russian Academy of Sciences, created in 1998 party organizer Eduard Kruglyakov, and V.L. Ginzburg became the main ideologist, who even then there were more than 80. In the publications of this commission, those scientists who dared to study these disgraced topics, in plain text were declared ignorant, fraudulent and pseudoscientists, and the critical articles themselves, including published in leading physical journals of Russia, were no longer in the genre of a correct scientific article, but in the genre of feuilleton. Often these articles were written by people who are not experts in the areas being criticized. research, and therefore do not have any scientific goals when writing such articles (and they criticized entire areas, including cold fusion in general). Consequently, such criticisms are replete with general statements, but substantive criticism in them are very superficial, vague, sometimes contains gross errors.

Here is a quote from the report of Academician E.P. Kruglyakov [Kruglyakov 1999] (who was involved in the project "Hot" fusion before his appointment to the post of head of the commission on pseudoscience), from which, in principle, the motivation for such a struggle is quite clear and understandable:

> “In the history of cold fusion, the Russian Academy of Sciences turned out to be inconsistent, "blessing" in January 1996 Interdepartmental coordinating council on the problem of “cold nuclear fusion”. The inconsistency went sideways for us. They explained to us that this is a small a bunch of people who don't bother anyone. Alas, this is not the case. Militant ignoramuses have already turned to the government with a demand to give them funds for construction of a pilot plant for cold nuclear fusion. "

And these are quotes from an article in the leading Russian physics journal "Uspekhi fizicheskikh Sciences "[Arzhannikova 1999]:

> “Unscrupulousness has never led to any good. It took ten years a strange isolated community that "produced" contradictory, erroneous and simply illiterate work. Traditional science is squeamish looked at the activities of this "sect" and did not express her attitude in any way. "

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> “It's time, finally. Russian Academy of Sciences and Minatom to speak out! Silence only encourages ignoramuses and adventurers to new "exploits" ”.

With regard to new areas of research, such criticism in the spirit of a party editorial The 1930s can bring nothing but harm to science. But worst of all is that such methods do not meet with massive resistance among scientists in Russia. A lawsuit was recently filed in the United States Ruzi Taleyarkhan against the authors of public allegations of falsification of the results of his

experiments of "bubble" thermonuclear fusion. This happened after the independent
a closed investigation by the university where Taleyarkhan works removed
scientific suspicion of falsification. Neither such an investigation nor such a lawsuit in modern
Unfortunately, they are inconceivable to Russia. Unsubstantiated allegations of fraud, i.e.
slander, moreover, from the side of the Presidium of the Academy of Sciences - people in Russia are already accustomed to this.
Lack of ethical restrictions, disaster with the level of funding for science, and
the continuing outflow of young talented scientists from Russia gives grounds
assume that this review, if it will develop in the future in terms of new
results will hardly contain new names of young researchers.

And, of course, the commission for the research of spin-
torsion interactions, which also have their place in this review.
The attitude of the scientists themselves to this activity of the commission is quite unambiguous - it was christened
the Inquisition, and the criticism of academics, of course, does not remain unanswered. The mood
LENR researchers in Russia and assumptions about the prospects for obtaining support from
power structures vary from complete pessimism ("in Russia there is nothing
interests, except for theft ") to the hope that interest will nevertheless appear.
events from Japan certainly added such hope.

There is also a spoonful of honey in the current situation of scientists in Russia and other countries of the former USSR,
true, very peculiar. Left virtually without funding and plans
research descended from above, those researchers who have not left science at all,
got the opportunity to do what they want. It turned out to be a situation of hungry freedom
unimaginable in the West, where scientists are bound by rather strict obligations to
by those who fund their research. On the one hand, quality results on
knee is difficult to get, on the other hand, on the remnants of old equipment and accidental
access to modern equipment, with the enthusiasm and proper qualifications in
some areas can be done as much as leading researchers in
the past times of the heyday of Soviet science. This situation of freedom of scientists abandoned to
arbitrariness of fate, apparently, and contributed to the emergence of the results described in
this review. No academicians can interfere with a researcher who already has nothing
lose, explore what he wants.

eleven. The effect of the Shpilman and Akimov generators

A.A. Shpilman is a research engineer from Karaganda (Kazakhstan), who develops
constructions of the so-called axion (torsion) generators and conducts the almanac "Free Search"
(http://www.spinfields.hut2.ru/ALMANACH/Almanach.htm). Research results
the effects of these generators are mostly subjective, since they tend to be
evidence of how people feel under the influence of these generators, including

psychics. There are also several objective experimental results that speak of
the fact that the "axion beam of the generator" affects the mechanical properties of metals [Myachin
2001], [Dakhno] and influences the nature of oscillations of the torsion pendulum [Shpilman 2001-2]. But to
our topic is primarily a study by Sue Benford,
researcher from the USA [Benford 2002]. This study consists of irradiation with
using the Spielmann X-ray film generator used for track analysis
nuclear particles, in order to detect hypothetical particles - axions.

As Benford concludes, spots are visible on the film after irradiation that cannot be
associated with any known particle species. In addition, in a photographic emulsion

traces of chemical elements were found, which were not in it before the irradiation: “Results show that the exposed areas (with spots and traces) contain negligible the amount of sulfur, magnesium and aluminum; despite the fact that the main area contains only carbon, nitrogen and oxygen ". According to Shpilman, spots are formed due to electric discharge of some unknown phase of a substance on a photographic emulsion, and traces of elements - this is just the result of the "condensation" of this phase of matter into the ordinary state, and this itself the substance can appear both from the active parts of the generator, and from the surrounding space.

Although we are primarily interested in the results themselves, let's consider what is introduces the Spielmann generator [Spielman 2001-1]. This is an electromagnetic device the main element of which is a permanent toroidal magnet, windings wound around the magnet, to which an alternating voltage of a certain frequency is applied, as well as electrodes designed to configure the emerging "axion beam" - they are fed constant pressure. This design is very similar to an electric motor generator. Akimova [Akimov 1995], [Shipov 2006]. Impact of non-electromagnetic component generator Akimov for alloys is confirmed by numerous experiments and even tested in industry - alloys clearly change their characteristics.

The torsion theme in Russia, like cold fusion, is rather scandalous. due to the activities of the commission on pseudoscience. For this review, it is noteworthy following. According to the theory of physical vacuum by G.I.Shipov [Shipov 1997], the sources torsion field are all particles with spin, including neutrinos. Strange the impact of the beams of generators designed by Akimov has numerous confirmations - both when acting on biological systems and on the properties of materials and physical processes, similar evidence of phenomena are also from the operation of torsion generators other designs. In the USSR from the mid-80s until the collapse of the country there was an extensive program of research on spin-torsion effects, in which hundreds of researchers have been involved and the results are reflected in hundreds of publications. So Thus, the accusations by the commission of torsion researchers that they are engaged in swindle and fraud - either elementary lack of information, or deliberate False.

These effects are not explained by traditional theories. Among the properties of these fields - a completely different nature of passage through materials than that of an electromagnetic fields. Thus, in experiments with a change in the properties of melts, the generator beam penetrates through a closed grounded metal container with solidifying metal, changing it crystal structure.

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The simplest source of a torsion field, according to Shipov's theory and research Akimova, a permanent magnet acts. In fact, numerous generator designs torsion / axion fields based on configuration and modulation non-electromagnetic field component from the magnetic core. Also as claims Shipov's theory of physical vacuum, the source of the torsion field is all rotating objects.

12. Influence of rotation on radioactivity sensors

In this regard, it is very interesting to consider the results of experiments that indicate the effect of rotating bodies on radioactive decay. Let's start with a simple experiment

which is described in the collection "Exploratory experimental studies in the field of spin-torsion interactions", published in Tomsk in 1995 [Tomsk 1995].
The collection contains experiments carried out by a group of researchers from 1988 to 1993 year at Tomsk Polytechnic University. In the article by S.G. Ekhanin, B.V. Okulov, G.S.Tsarapkina, V.I.Luneva "Detection of the effect of the spin-torsion field the gyromotor on the readings of the gas-discharge detector of ionizing radiation "it is shown that in the immediate vicinity of a rapidly rotating body (a gyromotor was used) at Geiger counter distorts the shape of the count rate distribution histogram (Fig. 12-1). The Poisson distribution splits into a two-humped one, and a sharp failure, and this effect persists for some time after stopping the gyro (the effect metastability).

Fig. 12-1. Background histogram (a), exposure histogram (b), aftereffect histogram (c) (illustration from [Tomsk 1995]).

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When replacing the sensor with a scintillation one based on sodium iodide, counting intensity measurements (work "Detecting the effect of spin- the torsion field of the flywheel of the gyromotor for the readings of the scintillation detector ionizing radiation "by the same authors). Result: when the flywheel rotates, the average the scintillation intensity decreases by about 1%, and it is also observed the effect of metastability. Experiments show that the impact of a rotating the body is not shielded by a multi-layer aluminum shield. Also the authors found the next effect: when the gyromotor is placed in a ferromagnetic housing the sensor's sensitivity to torsion effects has increased.

I will cite the conclusions of the authors from the work "Possibility of increasing the sensitivity scintillation detector of ionizing radiation to torsion fields ":

> "a) A gyromotor operating in a nominal mode has a torsion field (torsion field), which acts on the sensor of the RSP-101M radiometer through metal earthed shields, including ferromagnetic ones, and causes reduction of the arithmetic mean readings of the radiometer by several percent;

b) The use of additional screens can serve as a method of significant increasing the sensitivity of the RSP-101M radiometer to torsion fields;
c) The flywheel of the gyromotor, rotating by inertia, like the flywheel of the gyromotor, operating in nominal mode, also has a torsion field and causes a similar decrease in the readings of the radiometer;
d) A stopped flywheel has a residual (phantom) torsion field, whose influence on the radiometer sensor continues, but decreases in time;
e) When moving the stopped flywheel away from the sensor, the arithmetic mean The counts does not immediately return to the arithmetic mean of the background counts. it indicates that the radiometer sensor has a memory of the effect on torsion fields. However, this memory quickly fades in time. "

13. Melnik's experiments

Studies by IA Melnik from Tomsk [Melnik 2007] indicate that a rotating body affects the rate of decay of radioactive elements. During of the experiment, the integral area of the peak of gamma radiation of various radionuclides (^{137}Cs, ^{60}Co, ^{239}Pu, ^{241}Am, ^{198}Au, ^{65}Zn). The miller spent quite thorough research on the effects of electromagnetic interference from engine operation, and the contribution of the non-electromagnetic component is highlighted.

The results showed that in the case of ^{60}Co (beta decay), the rotation of bodies near the sample reduces the intensity of decay, and also splits the shape of the intensity histogram into two-humped and three-humped - depending on the distance to the rotating body. For alpha decay (plutonium and americium), the following picture was obtained: the intensity of the peak ^{241}Am decreased, while ^{239}Pu increased. Speed and speed also affect the size of the effect. direction of rotation. After stopping the rotation, the effect remains for some time - already the familiar metastability effect. It has been shown that this influence is not electromagnetic

by nature, and that this effect is also influenced by closely spaced non-rotating objects.

But the most original were the results obtained by Melnik on samples ^{198}Au. Two samples were irradiated with the same neutron source (in a nuclear reactor). Then these samples were separated. One sample (worker) was subjected to the effect of a rotating body, the second was a control one, and such an effect was not exposed, being distant from the first. Simultaneous measurement was performed decay intensity in both samples, the decay correlations in them were analyzed.

The result is surprising: with an increase in the time of exposure of the rotating body to the worker sample decay correlation between samples increased to 0.66, and decay fluctuations the control sample decreased significantly. The author writes:

"Interestingly, the exponential value of the variance of the first [control] the sample differs from the theoretical value by 10.8%, and for the second [working] sample difference values less than 1%. Thus, the decrease in fluctuations decay of the gold isotope in the control sample, most likely, is associated with information dependence with the second sample, on which in the given moment the impact is made. "

Further in the conclusions, the author writes:

> "Statistical analysis of the results obtained when measuring the isotope of gold, revealed the correlation of independent measurements and a significant decrease in fluctuations in the peak area for the control sample. Apparently, this the phenomenon is associated with the effect of quantum nonlocality. If we consider the kernels isotope of gold as quantum systems that interacted with each other another (i.e., in an entangled state) at the atomic-nuclear level in crystals salt, or in its solution, then a change in the state of one of the systems instantly will manifest itself accordingly in another system. In this case "modulated" vacuum fluctuations affecting the state of a quantum systems of the nucleus of the second sample, cause a correlation of the decay rate control sample. Accordingly, the dispersion of the active core also changes. After switching off the influence (static measurement mode in another indoors, in the absence of any rotating objects), dispersion returns to its original state. "

A similar effect was obtained by Melnik in experiments with ^{65}Zn and ^{137}Cs [Melnik 2008].

fourteen.Schnol - the effect of macro-fluctuations

For several decades S.E. Shnolem (Moscow State University, Institute of Biophysics RAS, Pushchino) and his colleagues are investigating the phenomenon of macrofluctuations of random physical processes [Shnol 1998]. He showed that in all physical processes on Earth (from noise in the gravitational antenna before alpha decay), the effect of non-randomness of the shape is observed small sample histograms. Nuclear reactions are no exception. During

For a number of years, the main setup for studying macrofluctuations was ^{239}Pu samples with alpha-particle counter, including collimators.

The effect of macro-fluctuations can be illustrated as follows. If you take any two physical processes, measure their speed once a second, and build histograms the speed of their flow, for example, 60 measurements in each histogram, and then in pairs compare these histograms, it turns out that the greatest similarity will have histograms corresponding to the moments of equality of the local time of the processes (so-called. local time effect). For time-adjacent histograms of the same process, it will be more likely to meet similar than for any other interval between histograms. There are periods of appearance of similar histograms, equal to sidereal days, sunny days, a 29-day period and an annual.

Experiments with collimated sources of radioactivity have shown that if you send collimator to the Polar Star, then the diurnal cycles of the similarity of the histograms disappear. If a rotate the collimator in the direction from east to west, then periods appear, corresponding to the joint rotation of the Earth and the collimator. Another curious result: if one collimator is directed to the west, and the second to the east, then the western one will be show histograms similar to those showing east 718 minutes (i.e. half sidereal days) ago.

The period of similarity of the histograms of one physical process of 718 minutes also appears in the time of the spring and autumn equinoxes. During solar eclipses on the entire surface Earth's physical processes show similar histograms. A similar effect has

place during the new moons. When approaching the poles of the Earth, the diurnal period disappears histograms. At the moments of rising and setting of the luminaries, characteristic histograms.

These results imply the existence of a certain cosmophysical agent acting on completely different physical processes (the same effects were obtained by the group Shnol when analyzing the noise current of zener diodes). But the most interesting is this effect looks in the light of the experiment carried out by S.E. Shnol and V.A. Panchelyuga in 2006 with rotating centrifuge and two stationary collimated ^{239}Pu sources [Shnol 2006]. In this experiment, it was periodically turned on and off quickly rotating centrifuge - with a period between complete cycles of 10 minutes. One the collimator was directed coaxially to rotation, the second - perpendicular (i.e. looked at centrifuge). Perpendicular collimator showed the period of appearance of similar histograms 5 minutes (i.e. half cycle on / off cycle). In this case, the axial collimator does not showed such periods. The authors suggest that histograms show similarities processes during braking and acceleration of the centrifuge.

The similarity of histograms by the Shnoll group is determined by an expert method (i.e. manually), for that their results were sometimes quite harshly criticized. Attempts to create a machine an algorithm that reliably reproduces the same effects as with the expert comparison method histograms have so far not been successful.

fifteen. Other studies

If you describe all the existing studies that indicate the existence of LENR, in this report, it will turn into a full-length book. I will only briefly mention some selected works of Russian researchers. A.F. Kladov obtained the results a significant decrease in radioactivity in a cavitating installation, where the solution the radioactive salt makes a vortex motion, passing through a closed cycle (http://roslo.narod.ru/rao/rao1.htm). A similar result was obtained by V.V. Lazarev from Institute of Physics, St. Petersburg, in the study of the company's cavitating installation Faraday Lab (http://www.faraday.ru/radioactivity.pdf).

E.A. Pryakhin and colleagues (Chelyabinsk) studied the biological effect of of "strange radiation" from Urutskoyev's apparatus on laboratory mice [Pryakhin 2006]. They showed that this radiation enhances cell division in bone tissue. IN experiments where, before being exposed to hard gamma radiation, mice were subjected to exposure to "strange radiation" (at a distance of 1 meter from the installation), was noted increased resistance to gamma radiation. The authors suggested that this radiation can affect human health.

Experiments with the generation of magnetic monopoles are carried out by I.M.Shakhparonov (Moscow). After exposure to the generator of electromagnetic pulses [Shakhparonov-patent 1990] on diamagnetic materials (including graphite, polymers, glass, ceramics) they acquire obvious paramagnetic properties [Shakhparonov-patent 1998], [Stanzo 1996]. The author points out that substances with the greatest oxygen content, which is paramagnetic. Shakhparonov calls the stream monopoles from the emitter of its own design by Kozyrev-Dirac radiation. results the effects of this radiation on radioactive isotopes show an increase in the rate

beta decay process (in the patent "Method for the disinfection of radioactive materials" experimental confirmation for ^{131}I is mentioned [Shakhparonov-patent 1996]). Exposure to radiation on oil samples showed a complex pattern of apparent change the content of various elements depending on the exposure time [Shakhparonov 2004]. Biological studies of radiation (in mice) show that it biologically active, reduces blood clotting, leads to a decrease blood glucose, while at the same time it can increase immunity, as well as to increase resistance to gamma radiation [Shakhparonov].

VA Krivitsky [Krivitsky 2003] investigated the effect of an electric discharge in a melt of metals and showed that in this case there is a transmutation of elements. About 10 independent studies indicating the transmutation of elements with electromagnetic influences are described in the book edited by VF Balakirev [Balakirev 2003-2]. In 2003 the book "Nuclear Fusion and Transmutation of Isotopes in Biological Systems" was published [Vysotsky 2003].

sixteen. Conclusion

This review does not contain a generalized analysis of the considered results. However, I tried to pick up the individual pieces of the puzzle in such a way as to encourage readers who are experts in the areas under consideration, by themselves to correlate these pieces and experimentally check if they fit together, and if my hint at the commonality of these phenomena is just an illusion. Not being a physicist by training, I still I would venture to suggest that sooner or later some integral a picture of when generalizing experiments will appear, and when theory will catch up. Maybe, it will even be several pictures, and then what we see now as one incomprehensible the phenomenon will be studied as several, most likely, non-trivial phenomena. Maybe, what we now call LENR is only a small fragment of the new large pictures.

Criticism in this area is mainly motivated by the contradiction experimental results to established theories. But at the same time, this criticism is directed to specific research, often with a transition to the personality of researchers. For skeptics it is much easier to assume gross errors of experimenters and even falsification experimental results than to agree with the reality of a new, unexplored phenomenon. But hundreds of independent researchers around the world (they are now working without an official blessings and funding, and in Russia also under the pressure of the Academy of Sciences) cannot so err and falsify results that, taken together, these results suddenly accidentally formed a fairly clear and recognizable picture, indirectly confirming each other.

In addition, almost all of the above results were obtained as a result of many years of work. highly qualified specialists, and an unbiased look shows that there is no These studies have nothing to do with pseudoscience. Moreover, the campaign launched against many researchers by the Commission on Pseudoscience, deserves a separate journalistic investigation, as preliminary analysis shows that the objectives of this campaign not scientific at all.

You can endlessly criticize each of the pieces of the mosaic - he, they say,

uneven edges, it is splashed with mortar, and in general - it was accidentally found on the road, and trying to sell at the price of gold. However, it is foolish to criticize the mosaic made up of these pieces, if an amazing picture emerges through it.

But even if these results remain scattered strange facts and not wish to compose a coherent and meaningful picture of the life of low-temperature nuclear reactions, all the same, each of the considered pieces-phenomena in itself deserves the utmost attention. Discoveries arise exactly where strange the results do not escape the attention of researchers, and they have the courage to admit that their the results do not fit into the Procrustean bed of the prevailing theories. Let the laurels pioneers they get sometimes with a huge delay, or even do not get at all. I fully admit that to conduct a series of decisive experiments and ignite a massive interest will be able to one of the authoritative physicists in leading scientific laboratories, pushing towards researchers from the scientific underground. The issue here is not so much about strength. established theories, how much in the plasticity of the behavior of the scientific community.

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The path to truth is unpredictable. After all, real scientists are driven primarily by love of truth, and then everything else. How consistently it defends the truth is a scientist at the forefront of scientific knowledge, in extreme conditions of confrontation the majority, sometimes aggressive, is the main characteristic of him as a scientist. Not only the history of research on low-energy nuclear reactions, but the whole history of physics is a perfect illustration of this. It's only begining.

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